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THE ADOPTION OR REJECTION OF INNOVATIONS BY DAIRY FARM OPERATORS IN THE LOWER FRASER VALLEY.

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SOCIOECONOMIC CHARACTERISTICS, RESPONSES TO INNOVATIONS, AND USE OF INFORMATION SOURCES WERE CORRELATED FOR 100 RANDOMLY CHOSEN DAIRY FARMERS IN THE LOWER FRASER VALLEY OF BRITISH COLUMBIA. TEN DAIRYING INNOVATIONS WERE DIVIDED INTO TWO GROUPS ACCORDING TO COMPLEXITY. ADOPTION SCORES WERE USED TO CLASSIFY THE FARMERS AND STAGES OF ADOPTION (AWARENESS, INTEREST, EVALUATION, TRIAL, ADOPTION). CHARACTERISTICS POSITIVELY RELATED TO ADOPTION WERE ACTIVE INFORMATION SEEKING, SOCIAL PARTICIPATION, HIGHER INCOME, AND LARGE HERDS OF YOUNG STOCK. CHARACTERISTICS NEGATIVELY RELATED INCLUDED LONG DAIRYING EXPERIENCE, LARGE FAMILIES, AND LONG TENURE ON THE PRESENT FARM. AWARENESS CAME LARGELY BY MASS MEDIA, BUT PERSONAL CONTACTS WERE DOMINANT AT LATER STAGES OF ADOPTION. ON THE LESS COMPLEX INNOVATIONS, UNAWARENESS AND DISCONTINUATION WERE HIGHER, WHILE REJECTION, ADOPTION, AND CONTINUATION WERE LOWER. ABOUT HALF THE REJECTIONS OCCURRED DURING AWARENESS. DISTRICT AGRICULTURISTS AND FARM ORGANIZATIONS PLAYED A MINOR ROLE IN DIFFUSION AND ADOPTION. PROVISIONS FOR KEEPING CANADIAN FARMERS ABREAST OF DESIRABLE INNOVATIONS WERE JUDGED INADEQUATE. (THE DOCUMENT INCLUDES 43 TABLES AND 37 PREFERENCES.) THIS PUBLICATION IS ALSO AVAILABLE, FOR $2.00, FROM THE AGRICULTURAL ECONOMICS RESEARCH COUNCIL OF CANADA, COLONEL BY DRIVE, OTTAWA 1, CANADA. (LY)

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THE ADOPTION OR REJECTION OF INNOVATIONS BY DAIRY FARM OPERATORS IN THE LOWER FRASER VALLEY

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of

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SUMMARY OF THE STUDY

The continuous modernization of agricultural production in Canada depends upon the willingness of farmers to accept improved practices that result from developments in agricultural technology and research. This, in turn, is influenced by the sources of information which communicate new knowledge to farm operators. A farmer's acceptance or rejection of agricultural innovations is influenced by socio-economic factors characteristic of his situation and by his use of the sources of information available to him.

The study reported here has analyzed the characteristics of farmers with respect to their response to innovations and their use of information sources. The farmers studied were dairy operators in the Lower Fraser Valley in British Columbia who produce and market milk for fluid consumption under the quota system operated by the British Columbia Milk Board. From a universe of 1,617 farmers, a random sample of 100 farmers was interviewed, and a test for representativeness of the sample showed no statistically significant difference between the sample and the universe on the distribution of the population according to quota size.

Ten innovations introduced to dairy operators in recent years were selected for study. These were classified into two groups in terms of the complexity of the innovation, in order to control this variable better. The response to these innovations reported by the dairy operators provided an adoption score which served as the dependent variable for subsequent analysis of the data. On the basis of the adoption score, the sample was divided into adopter categories and by stages in the adoption process, in order that detailed analyses of the data could be made systematically. In this analysis, the earlier and later adopters were differentiated in terms of socio-economic characteristics and the use of information sources. A more detailed analysis of response to innovations over time was made, in order to determine the length of time involved in passing through the stages in the adoption process, and the point at which discontinuance or rejection occurred.

SUMMARY OF FINDINGS

There were few socio-economic characteristics that correlated with the adoption score at a statistically significant level. The two personal characteristics showing a positive relationship were the enjoyment of dairying and the amount of social participation. Negative relationships were found with number of years on the present farm and the number of children. Among the economic characteristics studied, positive relationships occurred between the number of young dairy stock raised and the family-farm plus off-farm income, while a negative relationship was indicated between income from other farming activities and the adoption of dairy innovations. Finally, a positive correlation existed between visits to the District Agriculturist in his office and adoption score, but a negative relationship with farm visits by the District Agriculturist. The earlier adopters were more successful and actively sought information, while the later adopters were less eager to change.

Age per se was not specifically related to adoption, nor did it differentiate between the earlier and the later adopters. Years of school completed was not related to adoption, but agricultural courses in vocational school did differentiate among the four adopter categories. The enjoyment of dairying was related to adoption score and differentiated between the earlier and the later adopters, and years of experience in dairying appeared to retard the acceptance of innovations.

The District Agriculturist

Twelve percent of the dairy operators reported no contacts of any kind with the District Agriculturist, while the dairymen in general had an average of 2.53 different types of contacts during the year preceding the study. Earlier adopters reported more contacts than did later adopters. The impersonal types of contacts with the District Agriculturist reached more dairymen than did personal contacts. Canadian-born farmers long established in the community had more contacts but were not necessarily more progressive and, in fact, they were less apt to adopt innovations. Recent immigrants sought out the District Agriculturist and were more inclined to accept innovations. A significantly higher percentage of the earlier adopters sought information through visits to the District Agriculturist than did later adopters and this was related to the acceptance of innovations. The District Agriculturist appeared not to be an important influence in the diffusion of dairy innovations.

Sources of Information

Dairy operators used different sources of information at different stages in the adoption process. Mass sources were most important at the awareness stage, with individual instructional sources assuming slightly more importance than personal sources at the interest stage. For the

remaining three stages in the adoption process, personal sources of information were of paramount importance. Commercial sources of information were most important at the awareness stage, and government sources were most used at the interest stage. Farm organizations were little used at any stage in the adoption process as a source of information. In general, the dairy operators had to depend largely on their own resources for information, since neither government nor farm organizations made any provisions to provide information effectively.

Adoption and Non-Adoption

There were more dairy operators who were not aware of the 10 innovations studied than there were who had adopted them. On the average, each respondent was not aware of 2.19 of the 10 innovations, was continuing in the adoption process for 1.57, and had rejected 4.38, adopted 1.66, and discontinued 0.20 innovations. Unawareness and discontinuance were higher for the less difficult innovations while continuation, rejection, and adoption were lower. Almost half of the rejections occurred at the awareness stage. This suggests that the sources of information failed to motivate the dairy operator and that he was inclined to reject an innovation before he knew enough about it to make an intelligent decision. The decision to reject involved less time than the decision to accept an innovation, but discontinuances were greater as the time spent in the adoption process was lessened, which suggests that decisions to adopt made in haste were more apt to be abandoned later.

The data provided in this study clearly indicate that the progressive improvement of agriculture in Canada requires more systematic attention to the continuing education of farmers. Agricultural innovations will not win acceptance by farmers without a more concentrated and persistent effort to supply adequate information about the innovation and to assist the farmer in reaching an intelligent decision about its suitability in his own situation. At present, neither government nor commercial or farm organizations are meeting this need adequately. Thus, the farmer himself is not solely responsible for the state of agriculture at any given moment in time, if he is not informed about desirable innovations.

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Chapter 1

The Study

The acceptance or rejection of innovations by farmers exerts a major influence on the economic viability of Canadian agriculture.[1] In the study reported here the response to innovations by a group of dairy operators in the Lower Fraser Valley of British Columbia has been examined. To do this, an adoption score was computed for each respondent, the group of dairymen was divided into adopter categories, and the stages in the adoption process were determined. These items were then used as a framework for the subsequent analysis of the data. Three specific aspects of the adoption process have been studied: (1) the socio-economic characteristics of the population and the relationship of these to the acceptance or rejection of innovations; (2) the use of specific sources of information by dairymen, which was analyzed to determine whether or not the origin of the information and the communication process influenced the farmers' use of information; and (3) the response to innovations which was analyzed to determine why recommended practices were rejected or accepted.

THE SETTING

The production, processing and marketing of all milk in British Columbia are controlled in some measure by the Milk Industry Act of 1956. Among other things, the Provincial Milk Board assigns a quota to dairy operators which controls the sale of milk for fluid consumption and sets the price for it. Non-quota milk is sold for manufacturing at a lower price. These quotas are subject to modification as adjustments in supply are needed to meet the demand for fluid milk. This system undoubtedly exerts some influence on the motivation of farmers with respect to the adoption of innovations that will increase production. This may be offset partially, however, by the fact that since 1962 the quotas themselves have been negotiable, which permits an operator to increase his quota by purchasing that of some other dairyman.

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[1] For a related study involving a different population, see: Coolie Verner and Frank W. Millerd, *Adult Education and the Adoption of Innovations by Orchardists in the Okanagan Valley of British Columbia*. Vancouver: Department of Agricultural Economics, University of British Columbia, 1966.

This control by the Milk Board has altered the dairy business appreciably. On December 31, 1955, before the introduction of the quota system, there were 3,632 primary producers in the Vancouver milk shed. By March 1, 1965, this number had dropped 55 percent to 1,671. During this period, there was a small increase in the number of dairy cows and a 15 percent increase in the annual milk production to some 470,163,000 pounds.

The Lower Fraser Valley is one of the finest and most intensive dairy farming areas in Canada. This valley occupies the extreme southwest corner of the mainland of the Province of British Columbia and extends from the Strait of Georgia on the west some 100 miles eastward to the entrance of the Fraser Canyon. The average width of the valley is about 25 miles and the total area is approximately 2,500 square miles. In 1961, the total area in farms comprised 274,588 acres, of which 198,458 acres were classified as improved land. The Valley is largely flat to rolling, ranging from sea-level to 1,000 feet or more in elevation. The soils are broadly classified as alluvial in the low-lying areas and Brown Podzols in the uplands, with some scattered areas of peat and muck.

The area has a marine climate with a mean annual temperature range of 27°F. July and August show a mean of 63°F while January and February have 37°F. The frost-free period ranges from 175 to 230 days. The mean annual precipitation ranges from 37 inches on the coast to over 80 inches at the eastern end of the Valley against the mountains. Some two-thirds of the rainfall occurs from October to March; July and August are the driest months with an average of less than two inches each, so that irrigation is needed for field crops.

The Valley has a wide range of agricultural activities including production of poultry, vegetables, small fruit and special horticultural products, and fur farming, in addition to dairying. In 1961, these activities accounted for 49.2 percent of the total Provincial farm cash income. Dairying in the Lower Fraser Valley accounted for 70.9 percent of the Provincial dairy cash income.

The total population for the region was 907,531 in 1961 and 772,998 of these were classified as urban, 107,511 as rural non-farm, and 27,022 as rural farm, indicating the presence of large urban markets for milk and milk products close by.

THE SAMPLE

This study is based on a random sample of those farmers in the Lower Fraser Valley who produce and market milk for fluid consumption under the quota system operated by the British Columbia Milk Board.

The universe consisted of 1,617 farms on the quota list in May, 1965.[2] A random sample of 6.2 percent was drawn by means of a table of random numbers.[3] This sample consisted of 100 farmers of whom four could not be contacted because they had moved from the area, and four others could not be interviewed because of language barriers.[4] These eight respondents were replaced by names from the list of alternates that had been drawn with the original sample.

Since the quota list maintained by the Milk Board provided data on the mean size of quota and on the distribution of the population according to quota size, it was possible to test the sample for representativeness. The mean daily milk quota of the universe was 420.4 pounds of fluid milk, while the mean of the sample was 502.8 pounds. A test for significant difference between these means produced a z value of $-.3596$ which was not statistically significant at the .05 level of confidence. A test of the frequency distribution according to the size of the daily milk quota produced a chi-square value of 10.183 which was not statistically significant at the .05 level of confidence (Table 1).

TABLE 1

Comparison of the Sample and Population Percentage Frequency Distributions According to Size of Daily Milk Quota by Use of the Chi-Square Test

Size of Daily Milk Quota in Pounds	Sample (s) %	Population (e) %	$\frac{(s-e)^2}{e}$
1 - 199	23	20.1	.4184
200 - 299	19	16.2	.4840
300 - 399	20	13.7	2.8970
400 - 499	7	11.1	1.5144
500 - 599	4	8.6	2.4605
600 - 699	4	6.2	.7806
700 - 799	4	5.4	.3630
800 - 999	10	7.5	.8333
1000 +	9	11.2	.4321
Total	100	100.0	10.1833

[2] Excluded from the universe were the managers of institutional farms and approximately 224 non-quota dairymen who sell milk for manufacturing purposes only.

[3] A five percent sample was originally planned but since this totaled 81 farmers, it was decided to increase the sample to 100 farmers so that the simple frequencies would equal percentages.

[4] Recent immigrants who could not use the English language were not interviewed.

PROCEDURE

Personal interviews were conducted between May 31 and July 6, 1965. To complete the 100 interviews, a total of 194 farm visits were required.[5] The principal decision-maker on the farm was interviewed according to a schedule which had been pre-tested on a sample of five farmers not drawn in the original sample. After editing for consistency of response, the data were keypunched for analysis on automatic data-processing equipment.[6] Statistical significance was accepted at the .05 level of confidence.

Innovations

Ten innovations were chosen as the basis for the study of the adoption behavior of the sample of dairy operators.[7] These were selected from a list of 40 innovations which had been introduced in the Lower Fraser Valley within the 10 years preceding the study. These innovations were considered to be essential for successful dairy farming by farm supply dealers, dairy farm specialists, and District Agriculturists. The 10 selected innovations were as follows:

1. Insecticide-impregnated cords for fly control.
2. Systemic warble fly control for young stock and bulls.
3. Heat lamps for weak calves or for calves born during very cold weather.
4. Heated water bowls or tanks.
5. Bulk bin storage for concentrate feed.
6. A hay conditioner.
7. A hay dryer.
8. Regular testing for mastitis at set intervals.
9. Washing the udder of each cow with a separate sterilized cloth or with paper towels dipped in a sterilizing solution.
10. Sterilizing the teat cups between use on different cows by rinsing in clear water and then dipping in a sterilizing solution.

These 10 innovations differ in complexity, and this factor may be an influence in determining the acceptance or rejection of the innovation.

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[5] Most interviews required two visits, because the farmers were extremely busy at this time of year. In view of this, it is surprising that there were no refusals.

[6] The IBM 7040 Computer at the University of British Columbia Computing Centre was used.

[7] The suggested innovations were screened to ensure that those selected fell within the range of free choice for the farmer. Bulk milk handling, for example, was eliminated because it was required by some firms purchasing milk.

In view of this, therefore, the innovations were divided into two groups according to the classification suggested by Lionberger.[8] Group 1 includes those innovations which are relatively uncomplicated and which a farmer might adopt without too much difficulty, while those in group 2 are more complex and therefore more difficult to adopt.[9] The differences in the characteristics of the two groups of innovations are as follows:

Group 1	Group 2
Adoption involves a change in existing operations with or without a change in materials or equipment.	Adoption involves a change to new techniques or operations.
Relatively inexpensive.	Relatively expensive.
Results of adoption not readily observable.	Results of adoption readily observable.
Relatively easy to try on a small scale and easy to retract an adoption decision.	Relatively difficult to try on a small scale and difficult to retract an adoption decision.

The five innovations classified here as group 1 include numbers 1, 2, 8, 9, and 10 as listed above, and those numbered 3, 4, 5, 6, and 7 in group 2. In subsequent discussions involving the innovations, they will be treated by group rather than individually, thereby making the results reported here more readily comparable with research carried out in the United States. The data gathered about each innovation identified the applicable stage in the adoption process and, if the innovation had been adopted at one time, whether or not it was still in use. If an innovation had been rejected, the stage at which this occurred was determined as well as the reasons for the rejection. In addition, the time sequence through the stages in the adoption process was recorded for each innovation, along with the most important sources of information used at each stage.

Stages in the Adoption Process

The decision to accept or reject an innovation is not based on a simple dichotomy but involves a complex mental process that has been segre-

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[8] Herbert F. Lionberger, *The Adoption of New Ideas and Practices*, Ames: Iowa State University Press, 1960.

[9] Although the adoption of innovation No. 5 involves a change in existing operations rather than a new technique, and even though innovation No. 3 is relatively easy to try, these two were placed in group 2 because in most respects their characteristics are the same as those in group 2.

gated into five stages, as summarized by Lionberger.[10] Beals *et al.*[11] conclude that this concept of stages in the adoption process is valid from evidence that it appears meaningful to adopters, and that they are aware that they do go through a series of sequential stages in the progress toward adoption. The five stages now generally accepted include: awareness, interest, evaluation, trial and adoption. Rogers[12] indicates that these stages are consistent with the nature of the phenomenon and potentially useful for practical application. These five stages are accepted here as the basis for subsequent analysis of the data.

Adoption Score

On the basis of the data collected about the innovations, an adoption score was computed for each respondent by assignation of a score for each reported stage in the adoption process. The values assigned each stage were: 0 for not aware, 1 for awareness, 2 for interest, 3 for evaluation, 4 for trial, and 5 for adoption. The minimum score for respondents unaware of any of the innovations studied would be zero and the maximum score for complete adoption of all 10 innovations would be 50. The range of adoption scores for the sample was from 6 to 41 and the mean score was 22.44, while the standard deviation was 7.33.

Adopter Categories

The adoption score recorded for each respondent provides a basis for dividing them into categories which identify the rate of response to innovations, ranging from those first to accept an idea or practice to those who are last or never adopt. Rogers[13] uses five categories which are identified as follows: innovators, early adopters, early majority, late majority and laggards. These categories provide a useful tool for making gross differentiations among the dairymen with respect to the time of adoption. Rogers suggests that any given group of adopters will approximate a normal curve in the distribution into adopter categories. No significant difference at the .05 level was found by a chi-square test between a normal distribution and the distribution of the respondents' adoption scores. This is illustrated in Table 2.

Socio-Economic Characteristics

Previous research suggests that certain socio-economic characteristics of farmers are related to the acceptance of an innovation. Such data will

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[10] Lionberger, *op. cit.*

[11] George M. Beals, E. M. Rogers, and J. M. Bohlen, "Validity of the Concept of Stages in the Adoption Process". *Rural Sociology* 22:166 - 168 (June, 1957).

[12] Everett M. Rogers, *Diffusion of Innovations.* N.Y.: The Free Press of Glencoe, 1962. pp. 152 - 158.

[13] *Ibid.* p. 162.

TABLE 2

Classification of the Respondents into Adopter Categories

Adopter Category	Class Boundaries	Number of Standard Deviations from the Mean	Number of Respondents in Each Category: Expected (Normal Frequency Curve) (e)	Number of Respondents in Each Category: Observed (Sample) Frequency (o)	$\frac{(o-e)^2}{e}$
Early adopter-innovator			15.74	16	.004
	29.77	+1			
Early majority			34.13	35	.022
	22.44	0			
Late majority			34.13	29	.771
	15.11	−1			
Laggard			15.74	20	1.153
				Chi-square value	1.950

NOTE: The null hypothesis that the sample frequency distribution approximated the normal curve distribution was tested at the .05 level of significance. The hypothesis was accepted since the calculated chi-square value was below the critical value of 3.841.

help to differentiate the adopter categories; however, the research is not in complete agreement respecting the influence exerted by certain specific characteristics on the adoption of innovations. There tends to be more general agreement that the earlier adoption of innovations is associated with youth, a cosmopolitan attitude, a more favorable financial position, a willingness to take risks, more specialized operations, larger farms, higher social status, greater social participation, and the use of hired labor. There is less agreement with respect to the influence of family factors, ethnic origins, farming experience, tenure, non-farm employment and educational level.[14]

The socio-economic characteristics used in this study have been grouped under three main headings: personal factors, economic factors and information-seeking characteristics.

Sources of Information

Farmers learn about innovations in a variety of ways and different sources of information function differently with respect to the stages in the adoption process as well as in terms of the adopter categories. The sources of information used in this study and the systems of classification for analysis are explained in Chapter 3.

[14] For more detailed information see Rogers, *op. cit.* pp. 172 - 178 and Lionberger, *op. cit.* pp. 96 - 106.

Rejection, Delay and Discontinuance

Not all agricultural innovations introduced to farmers are accepted, some are accepted but later discontinued, and frequently there is a delay on the part of the farmer in reaching a decision to accept or reject an innovation. This variable response to innovations has been analyzed in this study in terms of the time element involved in passing through the stages in the application process and the reasons why a delay occurred or an innovation was rejected or discontinued.

The respondents were interviewed so as to identify the most important causes of a delay or a rejection of an innovation. These reasons were classified into two categories which related to the characteristics of the innovation and also to the particular situation of the individual farm operator. In the first instance, the characteristics of the innovations were identified as to be consistent with those enumerated by Rogers[15] and included the following items:

Relative Advantage: indicating that the innovation offered no real advantage over existing practice.

Compatibility: in which the innovation was not consistent with the values or past experience of the respondent.

Complexity: the innovation was too difficult to understand and to use.

Divisibility: the innovation could not be tried on a limited basis.

Communicability: the results of using the innovation were not clearly evident.

The second category of reasons involved factors present in the respondent's particular situation, including:

Situation not Appropriate: the innovation was not relevant to the respondent's farm.

Scale of Operation too Small: acceptance of the innovation was not justified by the size of the particular operation involved.

Insufficient Capital: the innovation involved the expenditure of money that was not then available to the farmer.

Other Factors: not otherwise included in the above items, such as the case where local dealers could not supply the required items.

These two categories of reasons were used in analyzing the causes of delays in passing through the stages of the adoption process, of rejections, and of discontinuances.

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[15] Rogers, *op. cit.* pp. 124 - 134.

Chapter 2

Socio-Economic Characteristics

The dairy operators in the Lower Fraser Valley tended to be middle-aged, with 20 or more years of farming experience. Most of them had less than an eighth grade education and half were immigrants to Canada. Although they had a median income of less than $3,500, only one-fourth worked off their farms. Furthermore, as a group, the dairymen were not much inclined to adopt new agricultural innovations. In some respects, these farmers differ but little from farmers elsewhere on this continent and yet, on the other hand, they do have some distinctive characteristics.

Previous research has indicated that the socio-economic characteristics of a population are related to the acceptance or rejection of innovations.[1] The factors studied here are grouped under three descriptive headings which include Personal, Economic and Informational Characteristics. These are discussed in detail below and related to the adoption of innovations[2] (Table 3).

PERSONAL CHARACTERISTICS

Age

The age distribution of the sample was skewed toward the upper age groups. Only 14 of the respondents were below 35 years of age, while 30 were over 55 years old.[3] The age group 35 to 44 years had 23 percent of the sample and 33 percent were from 45 to 54. Thus, 37 percent were below 45 and 63 percent were above that age. Age per se was not related to adoption.

The older the farmer, the greater the number of years of farming experience. Also, the older farmers who were immigrants arrived earlier, and older farmers used more hired labor.

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[1] See: Lionberger, *op. cit.* and Rogers, *op. cit.*

[2] The detailed data tables are available in Peter M. Gubbels, "The Adoption and Rejection of Innovations by Dairymen in the Lower Fraser Valley." Unpublished M.S.A. thesis in Agricultural Extension, Department of Agricultural Economics, University of British Columbia, August 1966.

[3] Since the sample consisted of 100 respondents, the whole numbers are also the percentages of the frequencies and are used interchangeably.

Marital Status

Ten percent of the sample were single, two percent were widowed and 88 percent were married. Since most of the respondents were married, marital status was not tested for interrelationships with other characteristics.

Number of Children

The majority of the married respondents had children, with only four reporting no children. Thirty respondents reported having one or two, and 56 reported three or more. An equal number had three to four children as had five or more.

Education

The median educational level was from five to eight years of school completed. Eighty of the farmers had less than high school graduation, 17 had graduated, two had completed senior matriculation and one was a university graduate. Two of the respondents had less than five years of school completed and so would be classed as functional illiterates. Ten had studied agriculture at high school and 12 had done so in a vocational school. All of those reporting the study of agriculture in vocational school were immigrants. Educational level was not related to adoption, but those with more education participated more in community organizations. Furthermore, the more education, the less experience in farming.

Enjoyment of Dairying

Sixty respondents reported that they enjoyed dairy farming very much, while only 14 reported that they enjoyed it not at all.[4] Most of those who enjoyed dairying most were foreign born, while those who did not were equally divided between the native and the foreign born. The greater the enjoyment of dairying, the higher the adoption score. The farmers who enjoyed dairying most did more off-farm work and had a higher average milk production per cow. Furthermore, they read more newspaper articles by the District Agriculturist but they had a lower non-farm income in spite of more off-farm work.

Experience

Most of the respondents were experienced farmers and dairymen. Twenty years or more in agriculture were reported by 75 percent and 54 percent had been dairymen for that length of time. Only four had been in agriculture and 11 in dairying for less than 10 years. Farming experience was not related to adoption, but the more years of experience in

[4] The enjoyment of dairying was measured on a three-point scale: not at all, some, and very much.

agriculture, the higher the age and the more years in dairying. The more experienced farmers received more visits from the District Agriculturist but they had lower educational levels and raised fewer young dairy stock. The longer the experience in dairying, the longer they had lived on their present farms and the less hired labor they used, and the less they read mail from the District Agriculturist.

Years on Present Farm

Thirty-eight of the respondents had lived on their present farms less than 10 years while 37 had lived there 20 years or more. The majority, however, had been on their present farms less than 20 years. The longer a farmer had occupied his present farm, the more he participated in community organizations, the more labor he hired, and the more mail he read from the District Agriculturist. The longer the residence, however, the lower the average production per cow. Years of residence was not related to adoption.

Immigration

Over half of those in the sample were immigrants and one-third of these had migrated to Canada before 1945. Only one farmer interviewed had arrived since 1955. Nearly half of the immigrants were born in the Netherlands and 16 were from Germany. The earlier the date of immigration, the older the farmer, the more young dairy stock he raised, and the more frequently he visited the District Agriculturist in his office.

Social Participation

The degree of social participation was measured by means of the Chapin Social Participation Scale;[5] however, this was modified by use of the average of the three years preceding the interview rather than one year. Church attendance was not included. The range on the scale was from 0 to 50 and the median category was 9 to 16. Higher social participation was found among the better educated, those earning more from other farm enterprises and those with larger daily milk quotas. Such farmers also used more unpaid family labor and they had fewer telephone contacts with the District Agriculturist.

Among this population, there was virtually no relationship between these personal characteristics and the adoption of innovations. In general, the partial correlation coefficients are quite low and the relationships among the characteristics are very tenuous. Only those which tested as statistically significant are reported.

Those farmers who enjoyed dairying most tended to have higher adoption scores; however, those with more children tended to have lower

[5] F. Stuart Chapin, *The Social Participation Scale*. Minneapolis: University of Minnesota Press, 1937.

scores.[6] Interrelationships among the personal characteristics show many that are to be expected, such as the significant coefficient between age and farming experience. On the other hand, some significant relationships are difficult to explain, such as the positive coefficient between number of children and the number of young stock raised or that the more the farmer enjoyed dairying, the more he did off-farm work but the lower was his off-farm income. Other than the obvious interrelationships among the socio-economic characteristics, there is little here that is comparable with other research.

ECONOMIC CHARACTERISTICS

As a general rule, the economic situation of the farmer tends to exert a major influence on his adoption of innovations. In this study, there were more characteristics classified as economic which were related to adoption than any other class of factors.

Farm Operations

The dairy farms in the Fraser Valley are not large but the land is used intensively. Although the farms studied ranged in size from 10 to 39 acres to over 400 acres, the median size was in the category of 40 to 69 acres. Most of this land was improved and devoted to dairying. The size of farm was not related to adoption but it was related to the amount of hired labor and to the number of acres devoted to dairying.

Farmers with larger acreage in dairying tended to have larger numbers of young dairy stock and to require more hired labor. Acreage in dairying was also related positively to visits to the District Agriculturist and to listening to his radio announcements. As the number of acres increased, however, the number of cows in the herd decreased. This seems to indicate that the larger farms attempted to be self-contained while the smaller farms concentrated on milk production and purchased the feed required for their larger herds. Smaller farmers, furthermore, were visited less frequently by the District Agriculturist and rarely read his column in the newspaper.

Only 18 of the respondents reported improved land used for other agricultural pursuits, and this did not exceed 70 acres on any farm. Such farmers tended to require more labor, to have greater incomes from farm operations other than milk production, and to have a higher total farm value. As a result of these non-dairying activities, these farmers sold significantly less milk and tended to rent all or part of their land.

Most of the respondents owned their farms while 21 reported owning part and renting part; 10 farmers were wholly renters and one a

[6] This seems to be a curious relationship not previously encountered.

manager. Those owning their farms hired more labor and used more unpaid family labor. Furthermore, they read the mail received from the District Agriculturist and they attached greater value to their farms.

Forty respondents hired no farm labor, 15 employed one or more men full time, and the remainder used seasonal labor only as needed. Thirty-three farmers used unpaid family labor more than the equivalent of one-half year of paid labor, while 30 reported no unpaid family labor. The more unpaid family labor available, the less hired labor was used. The more that a farmer worked off the farm, the more labor he hired and the greater was his total income. Apparently some farm operators hire labor to work their farms while they take better-paying jobs elsewhere.

Milk Production

Many of the dairy herds were small, and consequently the daily milk quota was small and the amount of milk sold annually was low. The median number of cows in the herd fell in the category of 20 to 29, with 33 respondents reporting less than 20 cows and two reporting more than 100.

There were no farmers with a daily milk quota of less than 100 pounds, and there were three who had quotas in excess of 2,000 pounds. The median fell in the category of 300 to 399 pounds. The amount of milk sold annually ranged from nine farmers selling less than 100,000 pounds to three selling in excess of one million pounds. The majority of the farmers sold between 100,000 and 500,000 pounds of milk annually and the median was between 200,000 and 300,000 pounds of milk sold in 1964. The average production per cow was high, with the median between 9,500 and 10,999 pounds per cow in 1964. Only one farmer reported an average per cow in excess of 14,000 pounds while six reported less than 7,000 pounds for 1964.

Holstein cows were the most popular and these were found on 33 farms, with 46 reporting predominantly Holstein herds. None of the farmers had Ayrshires exclusively although three had some cows of this breed. Guernsey and Jersey breeds were reported by 18 farmers as constituting their herd wholly or predominantly. Only two farmers used only bulls for breeding while 87 used artificial insemination only and 11 farmers used both. Nearly all of the farmers had young stock, with 42 reporting fewer than 10 and three having eight or more. Eighty-four of the farmers had fewer than 30 young stock.

Among the several variables studied which describe the dairy operation, the size of herd was the most important. The larger the herd, the more milk sold, the more young stock owned, the more hired labor used, and the greater the total income. The larger the herd, however, the

lower the average production per cow. Farmers with the larger herds did less off-farm work and derived less of their income from farming enterprises other than dairying than did those with smaller herds. Dairymen with large daily milk quotas sold more milk, and had higher incomes and more valuable farms, while their income from sources other than dairying was low. The more milk a farmer sold, the greater was his average production per cow. Such farmers also tended to attend more meetings and field days conducted by the District Agriculturist.[9]

Income

Most of the respondents were specialized dairymen, with only 18 reporting income received from farm activities other than dairy operations. Sixty-eight of the farmers had no non-farm income but eight reported that they had other income that was equal to or greater than their farm income. The median farm-family net income was in the category of $2,500 to $3,499. Forty-three farmers reported a net income below this median and only 10 respondents reported a net income in excess of $5,499.00.

As the income from non-farm work increased the farmer enjoyed dairying less, which may indicate either that he worked off the farm more because he disliked dairying or that he disliked it because it was not his primary activity. As income from other farm activities increased, the total net income of the farmer increased but the adoption of innovations related to dairying decreased. Income from other than dairying was related to the number of acres of improved land in non-dairying activities, and such farmers had lower daily milk quotas and fewer cows in their herds. They had a higher social participation score and they consulted the District Agriculturist more frequently by telephone or office visits but he made fewer farm visits.

The total net income increased with the increase in size of the dairy herd and the size of the daily milk quota, but such farmers had fewer young dairy stock. Children apparently contributed to the net family income in that the more children there were, the higher was the net income. Also, as the total net income increased, the amount of off-farm work increased. District Agriculturists made more farm visits as the total net income increased, and this probably contributed to the fact that the adoption rate increased as the total net income increased.

The median farm value reported was in the category of $49,950 to $79,949. Three farms were valued by their owners at less than $25,000 and nine at more than $150,000. There was no relationship between

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[9] The apparent contradictions here are explained by the use of partial correlation coefficients as shown in Table 3.

TABLE 3 **Partial Correlation Coefficients**

		Adoption score	Age	Number of children	Educational level	Enjoyment of dairying	Years of farming experience
Adoption score	1	1.000					
Age	2	—.114	1.000				
Number of children	3	**—.210**	—.037	1.000			
Educational level	4	.102	.029	—.028	1.000		
Enjoyment of dairying	5	**.220**	.112	.086	—.020	1.000	
Years of farming experience	6	.124	**.446**	.196	**—.230**	.041	1.000
Years of dairying experience	7	.045	.162	—.024	.169	—.101	**.472**
Years on the present farm	8	**—.243**	.029	—.188	.021	.042	.013
Year of immigration	9	—.091	**.261**	.052	—.054	—.101	.086
Social participation	10	**.216**	.122	.066	**.259**	.132	—.100
Total size of farm in acres	11	—.134	—.019	—.193	.050	.031	—.030
Improved acres devoted to dairying	12	.010	—.146	—.123	.010	.102	.165
Improved acres for non-dairying enterprises	13	.097	—.106	—.030	.089	—.090	—.031
Tenure	14	.163	.069	—.114	—.123	**—.199**	—.063
Size of daily milk quota	15	—.028	.015	**.210**	—.013	—.057	—.143
Number of cows in the dairy herd	16	—.120	—.154	—.134	.054	.174	.006
Amount of milk sold	17	.064	.013	—.066	.016	—.159	.023
Average production per cow	18	—.047	—.048	—.008	—.087	**.321**	—.103
Number of young dairy stock raised	19	**.400**	.134	**.286**	.025	—.089	**—.232**
Amount of off-farm work	20	—.143	—.162	—.092	—.103	**.321**	—.093
Amount of hired labor used	21	—.082	**.298**	.140	—.122	—.143	—.032
Amount of unpaid (family) labor used	22	—.009	.034	.112	—.047	—.070	—.017
Income from other farm enterprises	23	**—.291**	—.125	—.054	—.100	.147	.173
Non-farm income	24	.155	.010	.033	.054	**—.304**	.094
Family farm plus off-farm employment income	25	**.223**	.045	**.213**	.026	—.011	.051
Farm value as a going concern	26	.023	—.073	.057	—.151	.093	.086
Visits to District Agriculturist's office	27	**.246**	.023	.116	—.015	—.120	—.105
Telephone calls to District Agriculturist	28	.122	.143	.104	.047	.032	—.097
Farm visits by District Agriculturist	29	**—.299**	—.191	**—.249**	.051	.092	**.261**
District Agriculturist meetings and field days	30	.053	—.136	—.100	.148	.153	.093
Mail from District Agriculturist	31	.115	.191	.017	.107	—.165	.007
Radio announcements by District Agriculturist	32	.076	.183	—.057	—.142	.009	—.115
Newspaper articles by District Agriculturist	33	—.069	—.175	—.041	.002	**.205**	.082

		Years of dairying experience	Years on the present farm	Year of immigration	Social participation	Total size of farm in acres	Improved acres devoted to dairying
Years of dairying experience	7	1.000					
Years on the present farm	8	.332	1.000				
Year of immigration	9	—.136	—.010	1.000			
Social participation	10	—.032	.222	—.154	1.000		
Total size of farm in acres	11	.122	—.162	.023	—.005	1.000	
Improved acres devoted to dairying	12	.053	—.158	—.070	.008	.559	1.000
Improved acres for non-dairying enterprises	13	.052	.112	.066	—.146	.020	—.222
Tenure	14	—.051	.091	—.082	—.165	—.174	—.079
Size of daily milk quota	15	.060	.022	.120	.257	.014	.162
Number of cows in dairy herd	16	.043	—.129	—.086	—.092	.108	—.270
Amount of milk sold	17	—.020	.073	.090	—.064	—.178	.180
Average production per cow	18	.058	—.274	.007	—.061	—.049	—.112
Number of young dairy stock raised	19	—.070	.209	.209	—.117	.129	.243
Amount of off-farm work	20	.194	—.085	.121	—.006	—.014	—.132
Amount of hired labor used	21	—.238	.224	—.146	.085	.277	.282
Amount of unpaid (family) labor used	22	.064	—.124	.145	.208	.143	—.037
Income from other farm enterprises	23	—.119	—.051	—.113	.280	.094	—.095
Non-farm income	24	—.147	.147	—.064	.117	—.034	.102
Family farm plus off-farm employment income	25	—.007	—.066	—.058	—.148	—.017	.110
Farm value as a going concern	26	.066	.092	—.057	.127	.158	.048
Visits to District Agriculturist's office	27	—.017	—.032	.207	.112	.014	.279
Telephone calls to District Agriculturist	28	.139	.086	—.016	—.238	.042	—.091
Farm visits by District Agriculturist	29	—.043	—.187	—.141	.127	—.098	—.203
District Agriculturist meetings and field days	30	.003	—.128	.058	.005	.189	—.163
Mail from District Agriculturist	31	—.230	.280	.032	.082	—.030	.164
Radio announcements by District Agriculturist	32	.048	.014	.023	.133	—.180	.201
Newspaper articles by District Agriculturist	33	.026	.005	—.123	—.177	.198	—.211

		Improved acres for non-dairying enterprises	Tenure	Size of daily milk quota	Number of cows in the dairy herd	Amount of milk sold	Average production per cow
Improved acres for non-dairying enterprises	13	1.000					
Tenure	14	**—.260**	1.000				
Size of daily milk quota	15	.029	.009	1.000			
Number of cows in the dairy herd	16	—.024	—.018	.069	1.000		
Amount of milk sold	17	**—.211**	—.166	**.275**	**.645**	1.000	
Average production per cow	18	.141	.052	.194	**—.541**	**.515**	1.000
Number of young dairy stock raised	19	—.130	.033	—.028	**.315**	.007	.042
Amount of off-farm work	20	—.157	.044	.000	**—.217**	.015	—.165
Amount of hired labor used	21	**.233**	**.197**	—.061	**.372**	—.017	.155
Amount of unpaid (family) labor used	22	.079	**.255**	—.076	.065	.096	.004
Income from other farm enterprises	23	**.400**	.154	**—.201**	**—.264**	**.256**	—.126
Non-farm income	24	.089	—.077	—.114	.128	—.012	.187
Family farm plus off-farm employment income	25	.166	.009	**.276**	**.254**	—.031	—.053
Farm value as a going concern	26	**.485**	**.325**	**.301**	—.004	.164	—.060
Visits to District Agriculturist's office	27	—.001	.136	—.187	.092	—.013	.091
Telephone calls to District Agriculturist	28	—.109	—.056	.141	.132	—.086	.011
Farm visits by District Agriculturist	29	.049	—.129	.157	—.152	—.054	.003
District Agriculturist meetings and field days	30	.044	.057	—.061	**—.254**	**.206**	—.054
Mail from District Agriculturist	31	.148	**.200**	—.132	**.266**	—.115	**.250**
Radio announcements by District Agriculturist	32	.153	.185	—.140	**.256**	—.028	.063
Newspaper articles by District Agriculturist	33	—.076	—.057	.136	**—.233**	.069	—.144

		Number of young dairy stock raised	Amount of off-farm work	Amount of hired labor used	Amount of unpaid (family) labor used	Income from other farm enterprises	Non-farm income
Number of young dairy stock raised	19	1.000					
Amount of off-farm work	20	.077	1.000				
Amount of hired labor used	21	—.168	**.272**	1.000			
Amount of unpaid (family) labor used	22	—.135	.092	**—.241**	1.000		
Income from other farm enterprises	23	**.200**	—.100	—.033	—.088	1.000	
Non-farm income	24	—.008	**.850**	—.107	—.077	.006	1.000
Family farm plus off-farm employment income	25	**—.199**	**.274**	—.132	.138	**.337**	—.019
Farm value as a going concern	26	.116	.023	.038	—.069	—.111	—.046
Visits to District Agriculturist's office	27	—.186	.098	—.088	—.045	**.198**	—.081
Telephone calls to District Agriculturist	28	—.026	.002	.039	.107	**.367**	—.002
Farm visits by District Agriculturist	29	**.258**	—.103	.190	—.042	**—.275**	.069
District Agriculturist meetings and field days	30	—.014	—.050	.148	.086	—.059	.010
Mail from District Agriculturist	31	—.111	.182	—.172	**—.212**	.052	—.179
Radio announcements by District Agriculturist	32	.004	.046	—.161	—.156	.046	—.067
Newspaper articles by District Agriculturist	33	.042	—.121	.144	**.262**	—.158	.135

		Family farm plus off-farm employment income	Farm value as a going concern	Visits to District Agriculturist's office	Telephone calls to the District Agriculturist	Farm visits by the District Agriculturist	District Agriculturist meetings and field days
Family farm plus off-farm employment income	25	1.000					
Farm value as a going concern	26	—.129	1.000				
Visits to District Agriculturist's office	27	—.193	.027	1.000			
Telephone calls to District Agriculturist	28	—.023	—.051	**.271**	1.000		
Farm visits by District Agriculturist	29	**.290**	.026	**.340**	**.409**	1.000	
District Agriculturist meetings and field days	30	—.074	.045	—.094	.002	—.036	1.000
Mail from District Agriculturist	31	.120	—.046	—.119	.106	.146	**.380**
Radio announcements by District Agriculturist	32	.002	—.086	—.114	—.042	.029	.168
Newspaper articles by District Agriculturist	33	.009	—.054	**.234**	.022	—.154	**—.284**

		Mail from District Agriculturist	Radio announcements by District Agriculturist	Newspaper articles by District Agriculturist
Mail from District Agriculturist	31	1.000		
Radio announcements by District Agriculturist	32	**—.256**	1.000	
Newspaper articles by District Agriculturist	33	**.478**	**.528**	1.000

NOTE: The bold face coefficients show a high degree of association. A significance test for r was carried out using the null hypothesis of no correlation with a .05 level of significance. The test is based on the assumption that under the null hypothesis of no correlation, the sampling distribution of the correlation coefficient can be approximated closely with a normal curve having the mean 0 and the standard deviation $1/\sqrt{n-1}$ where $n =$ the sample size. Therefore, the criterion is to reject the null hypothesis if $r < -1.96/\sqrt{n-1}$ or $r > 1.96/\sqrt{n-1}$ (i.e. if the partial correlation coefficient is less than —.197 or greater than .197).

reported farm value and the adoption of dairy innovations. As farm value increased, the number of improved acres devoted to other farm activities also increased, as did the daily milk quota.

INFORMATION-SEEKING CHARACTERISTICS

The British Columbia Department of Agriculture has four District Agriculturists stationed in the Lower Fraser Valley.[8] Contacts between these agents and the dairymen were measured in an effort to assess the information-seeking characteristics of dairy operators. Most of the farmers had little or no contact with the District Agriculturist during the year preceding the interviews. Seventy-five percent of the farmers reported that they had not visited the District Agriculturist in his office, 73 percent had not contacted him by telephone about farm matters, 85 percent had not been visited on their farms by the District Agriculturist and 85 percent had not attended meetings or field days which he had conducted. At least 75 percent of the dairymen reported no personal contact with the District Agriculturist during 1964. The small number of farmers that did have contacts reported these as only sparing. None reported more than three office visits during the year, two percent had telephoned him four to five times and only one farmer reported that the District Agriculturist had visited his farm four to five times during the year. Meetings and field days were the most frequent form of personal contact and four percent of the farmers reported attending more than five such events.

The main form of contact between the farmer and his District Agriculturist was impersonal and abstract. This was achieved through circular letters, bulletins, and similar printed material. Sixty-six percent of the farmers reported receiving and reading such items. Radio announcements were heard by 47 percent and newspaper articles were read by 55 percent of the dairymen in the sample. These data are presented in Table 4.

An extension contact scale as established by Rogers and Capener[9] was used to measure the contacts between the farmers and the District Agriculturist. As indicated on Table 5, 12 percent of the farmers had no contact with the District Agriculturist of any kind during 1964, and none of the respondents had all seven types of contact. On the average, each respondent in the sample had 2.53 types of contact with the District Agriculturist. This varied with the adopter category as follows: laggard 1.55, late majority 2.69, early majority 2.80, and early adopter-innovator

[8] The provincial government maintains three dairy farm inspectors in the valley also, but these men are not responsible for educational activities with dairy operators.

[9] Everett M. Rogers and H. R. Capener, *The Country Extension Agent and His Constituents.* Ohio AES Research Bulletin 858, June 1960. p. 14.

TABLE 4

Percentage Distribution of Dairymen - District Agriculturist Contact

Type of Contact	Respondents Who Used the Contact %	Respondents Who Did Not Use the Contact %
Mail from the District Agriculturist	66	34
Newspaper articles by the District Agriculturist	55	45
Radio announcements by the District Agriculturist	47	53
Telephone calls to the District Agriculturist	27	73
Visits to the District Agriculturist's office	25	75
Farm visits by the District Agriculturist	15	85
Attendance at meetings and field days sponsored by the District Agriculturist	15	85

2.88 contacts. The significant interrelationships among the types of contact indicate that those who visited the office also telephoned more often; farmers who read the mail from the District Agriculturist attended more meetings; those who listened to radio programs read less mail; farmers who read the newspaper stories by the District Agriculturist, attended meetings less but read the mail and listened to his radio programs more frequently; and, finally, those who had more farm visits also visited the office and used the telephone more frequently.

TABLE 5

Percentage Distribution of Respondents by Extension Contact Score

Extension Contact Score		Respondents %
0		12
1		15
2		24
3		21
4		17
5		7
6		4
7		0
	Total	100

The partial correlations between socio-economic characteristics and contacts with the District Agriculturists show that some of the relationships were significant, as indicated on Table 3, but these were very tenuous. Office visits were made more frequently by farmers with more income from other farm activities and more improved acreage devoted to dairying. They also tended to adopt more innovations. The District Agriculturist, on the other hand, tended to visit the older, more established dairy farmers but these were not necessarily the most progressive and farm visits showed a negative correlation with adoption. Mail from the District Agriculturist was reported by the farmers who had been long established in the area, which may indicate that the mailing list used by the District Agriculturist is not kept up to date. These contacts with the District Agriculturist were not important sources of information for the farmers. Among the 22 main sources of information reported by the farmers, radio ranked 11th, agricultural organization meeting ranked 13th; agricultural meetings and adult education ranked 15th; the District Agriculturist ranked 18th; and agricultural field days ranked 19th in order of use.

Dairy farming is not the only agricultural activity in the Lower Fraser Valley and the milk-quota dairy farms constitute something less than one-third of all the farms in the area. Thus the four District Agriculturists must serve farmers involved in a variety of agricultural pursuits so it is not surprising to find few personal contacts between them and the dairy farmers. In their annual reports for 1964, the District Agriculturists indicated that 5.8 percent of the office calls and 5.4 percent of the farm visits were specifically related to dairying.

In addition to the District Agriculturists, the Provincial Government maintains three Dairy Farm Inspectors to serve the Valley but these do nothing more than inspect the dairy farms for compliance with health regulations and are not, therefore, an educational resource. The dairy operators have little assistance from government in the development and improvement of their operations and must depend primarily upon their own resourcefulness in acquiring information. This is discussed in more detail in Chapter 3.

ETHNIC INFLUENCES

In view of the large number of foreign-born respondents, the factor of ethnic origin was examined in greater detail. The largest single group from any one country was those who immigrated to Canada from the Netherlands. The sample was divided into three groups: Canadian-born, with 42 respondents; Dutch, with 23 respondents; and Others, consisting of 35 respondents. These three classifications were tested to determine if there were any significant differences among the three groups with

respect to certain socio-economic characteristics. The chi-square test was used with a null hypothesis of no significant difference at the .05 level of confidence.

There was no significant difference between the groups with respect to adoption score. Immigrants from the Netherlands were found to differ from the other two groups with respect to five characteristics while each of the other groups showed significant differences in four of the characteristics listed.

The Dutch farmers reported significantly higher participation in adult education courses in agriculture and significantly more of them reported that they enjoyed dairying very much, while more of those born in other countries reported that they did not enjoy dairying. Significantly more immigrants from other countries had worked in agriculture 20 years or more, but Canadian-born farmers showed a significantly longer residence on their present farms. More of the farmers from other countries had immigrated prior to 1945, while more of those born in the Netherlands had come to Canada after 1946.

Dutch farmers had higher daily milk quotas and sold more milk annually. Farmers from other countries hired no farm labor and used more unpaid family labor, while native-born farmers used less unpaid family labor and hired more farm labor. Immigrants from other countries reported no income from other sources, while more native-born farmers reported more income from other sources.

Contacts with the District Agriculturists did not differ among the three groups except in terms of reading mail. Dutch farmers did not, but native-born farmers did, read the mail from the District Agriculturist. This difference undoubtedly stems from language problems since the Dutch are the more recent immigrants.

The few differences encountered among the three groups are not such as to suggest that farmers from one place of origin are very different from those of another. This analysis does not assess attitudes, and the influence of ethnic origin may manifest itself in other ways not measured here.[9]

ADOPTER CATEGORIES

The partial correlations of socio-economic characteristics with adoption scores produced very few variables that had a significant relationship with adoption score, and those correlation coefficients that were statistically significant had only a tenuous relationship. A positive coefficient was found in the enjoyment of dairying, the number of young dairy stock

[9] See also: Helen Abell, "Some Reasons for the Persistence of Small Farms." *Economic Annalist*, Vol. XXVI, No. 5, 1956.

raised, the total net income, and visits to the office of the District Agriculturist. On the other hand, negative coefficients were found with the number of children, years on the present farm, income from other farm enterprises, and farm visits by the District Agriculturist. At most, these data indicate that the adoption of innovations was greater among the serious dairy farmers who enjoyed their work and actively sought new ideas, while those farmers who were less specialized and more firmly established in farming, were less apt to adopt dairy innovations.

As a further test of the data, the chi-square test with a null hypothesis of no significant difference at the .05 level of confidence was used to test socio-economic characteristics against the classification of respondents into adopter categories. In order to test for any gross differences between earlier and later adopters, the five adopter categories were combined into two categories; the innovators, early adopters, and early majority were combined to provide a gross measure of the earlier adopters, while the late majority and laggard categories were combined as later adopters. In this analysis, differences were found in the variables enjoyment of dairying, number of years of farming experience, number of young stock raised, and visits to the office of the District Agriculturist. A further, more refined analysis was provided by using four adopter categories. In this case, the number of respondents in the innovator category was too small, so that category was combined with the earlier adopters to provide only four rather than five adopter categories. With these four adopter categories, none of the variables that were found to be significant when using two adopter categories were also significant with four, and a different set of variables was found to be significant. These included agricultural courses in vocational school, total size of farm, average production per cow, amount of unpaid family labor, and total income (Table 6).

Two Adopter Categories

More earlier adopters reported the enjoyment of dairying, than did later adopters. Only four percent of the earlier adopters reported that they did not enjoy dairying, compared with 25 percent of the later adopters. The later adopters had more farming experience than did the earlier adopters. More than twice as many earlier adopters reported less than 20 years of farming experience than did later adopters.

Almost three times as many earlier adopters reported raising 20 or more young dairy stock than did later adopters. This difference was statistically significant at the .01 level of confidence. Visits to the office of the District Agriculturist were reported by 33 percent of the earlier adopters but only 16 percent of the later adopters reported one or more visits.

TABLE 6

Statistically Significant Chi-Square Values for Socio-Economic Characteristics Against Two and Four Adopter Categories

Socio-Economic Characteristics	Chi-Square Value	
	Using 2	Using 4
Agricultural courses in vocational school		8.621
Enjoyment of dairying	0.091	
Number of years farming experience	5.882	
Total size of farm		9.441
Average production per cow		8.312
Number of young dairy stock raised	9.690	
Visits to the District Agriculturist's office	3.855	
Amount of unpaid family labor		14.062
Total income		11.080

As indicated here, the earlier adopters have had less experience as farmers, enjoy their work, raise more young dairy stock, and actively seek information by visiting the District Agriculturist in his office. Later adopters, on the other hand, generally dislike dairying, have more farming experience, and do not seek information actively.

Four Adopter Categories

Thirty-one percent of the respondents classed as early adopter-innovators reported agriculture courses at vocational school compared with 15 percent of the laggards. The laggards, however, exceeded the percentage in the late and early majority categories who reported such courses. Almost all of the respondents who reported having had courses in agriculture at vocational school were immigrants from the Netherlands.

The total size of farms was significantly different among the adopter categories. Seventy-five percent of the laggards reported owning less than 70 acres while 72.2 percent of the early adopter-innovator category reported 70 acres or more. That late majority included 41.2 percent owning 70 acres or more, while the early majority included only 28.1 percent. In terms of the average milk production per cow, 68.8 percent of the laggards reported less than 9,500 pounds per year while the late majority had 26.5 percent, the early majority 25.0 percent, and early

adopter-innovators 22.2 percent. Furthermore, 90 percent of the laggards had an average production per cow of less than 11,000 pounds compared with 10 percent of the early adopter-innovator group.

Forty percent of the laggards used no unpaid family labor compared with 12.5 percent of the early adopter-innovator category. The greatest percentage using less than 27 weeks of unpaid family labor was found in the late majority and early adopter-innovator categories, with the lowest percentages in the early majority and laggard categories. In each instance, the percentages were approximately equal.

The late majority, early majority and early adopter-innovator categories had approximately the same percentages reporting a total income in excess of $2,500. These three categories had 60 percent or better, compared with 25 percent of the laggards. The laggard category can be described as small farmers operating inefficiently on a submarginal level, while the early adopter-innovator category operates larger farms more efficiently and successfully. The remaining two categories are less easily described as they do not evidence consistent characteristics in any developmental sequence.

Chapter 3

Sources of Information

Information about agricultural innovations is disseminated among farmers by a number of different agencies which use a variety of diffusion processes. Farmers themselves may react differently to information, and this reaction may be influenced by the agency originating the information and by the means which are used to get it to the farmer. In order to examine in detail the variable response of farmers to information, the 28 different sources reported in this study were classified and analyzed both in terms of the agencies which disseminated the information and in terms of the diffusion processes used (Table 7). In this analysis, the farmers' responses to the two aspects of communication are examined in terms of the stages in the adoption process and the adopter categories.

INFORMATION SOURCES CLASSIFIED BY ORIGIN

Information about innovations is disseminated to farmers in the Lower Fraser Valley by three principal agencies; therefore, the 28 sources reported in this study are analyzed first by classification according to the three agencies from which the information originated. In addition to these three principal agencies, however, some farmers get information for themselves from sources apart from those agencies. The classification of sources of information by origin, therefore, consists of the following sub-categories.

Government: information sources originating with the federal or provincial governments.

Commercial: information sources originating with business agents or establishments dealing with farmers.

Farm Organizations: information sources originating from farmers' organizations, such as cooperatives or cattle associations.

Personal: information sources that lie within the farmer's personal orbit such as his friends or neighbors, his family or his own observation and experience. This category is identical under both systems.

TABLE 7

Classification of Sources of Information

Sources of Information	Classification by: Nature of the Activity	Origin
General farm magazines	M	C
Special dairy magazines	M	C
B.C. Dept. of Agriculture publications	M	G
Canada Dept. of Agriculture publications	M	G
Radio	M	C
Television	M	C
Newspapers	M	C
Agriculture field days	IG	G
Agriculture meetings and adult education courses	IG	G
Vocational agriculture courses	IG	G
Farm organization meetings	IG	FO
District Agriculturist	II	G
Veterinarian	II	C
Dairy Herd Improvement Association Supervisor	II	FO
Salesmen or dealers	II	C
Visit to experimental farm	II	G
Milk vendor fieldman	II	C
Neighbors or friends	P	P
Wife, children or relatives	P	P
Observation of other farms	P	P
Foreign travel	P	P
Own experience	P	P

Key:

Nature of the Activity
- P: personal
- M: mass
- IG: instructional group
- II: individual instructional

Origin
- P: personal
- G: government
- C: commercial
- FO: farm organization

Source Use by Stage in the Adoption Process

At the awareness stage, the commercial sources of information were reported most frequently and constituted some 60 percent of all of the sources used at that stage. Thereafter, commercial sources declined to less than 10 percent at the evaluation stage but increased again to 30 percent at the trial stage, with no use of commercial sources reported at the adoption stage. Government constituted about 10 percent of the sources of information reported at the awareness stage, increased to some 20 percent at the interest stage but declined to less than five percent at the adoption stage. Farm organizations were only slightly used at the awareness stage and were not reported after the interest stage.

Since personal sources under this classification are identical with those under the nature of the activity, the pattern of source use is also

identical. The use of sources of information in this classification is illustrated in Figure 2.

The statistical test for significance of the differences in the use of information sources classified by origin are shown in Appendix Tables 1 and 2, for each stage in the adoption process. In most cases the differences in use at each stage were found to be statistically significant; however, no difference was found with respect to farm organizations at any stage.

The pattern of use through the stages for commercial sources is not comparable with that delineated by Verner and Millerd;[1] however, the use of government sources is more nearly similar, as are personal sources which they identify as informal. The category of farm organizations has no near counterpart in that study.

Source Use by Adopter Category

Laggards made greater use of farm organizations as a source of information than did any other category, but this was the least used source. Government sources were used less by laggards and personal sources used more than occurred in any other category. The laggards and the early majority were equal in their use of commercial sources, but they used them less than did the remaining two categories. The early adopter-innovator group used fewer personal and farm-organizational sources but more commercial and government sources.

The use of personal sources declined steadily as did farm organizations, while government sources increased steadily from the laggard to the early adopter-innovator category. Commercial sources showed slight variation. These data are illustrated in Figure 4.

The use of government sources showed a statistically significant difference between the laggard and the early adopter-innovator categories, but other than in this one case, no significant differences were observed in the proportional use of sources of information classified by origin among the adopter categories.

The uses of information sources by adopter category reported here differs somewhat from the research reported by Verner and Millerd, but more nearly coincides with that reported by Rogers. Verner and Millerd found that earlier adopters used personal sources more that later adopters did, and this differed from Rogers' findings. In the present study, earlier adopters used personal sources less, which agrees with Rogers' results but not with those of Verner and Millerd. This difference in source use between the present study and the earlier study by Verner and Millerd is less a difference in the character of the two populations than in the availability of information. According to Verner and Millerd, the District

[1] *Ibid.* p. 40.

Horticulturist was the chief source of information, and tended to serve the earlier adopters more than the later ones, while the population in this study had very little contact with the District Agriculturist and received little assistance from him, regardless of whether they were earlier or later adopters.

INFORMATION SOURCES CLASSIFIED BY NATURE OF THE ACTIVITY

In classifying and analyzing the sources of information by the diffusion processes employed in the dissemination of information to farmers, it is possible to assess more closely the methods of communication which are accepted by the farmers. In some cases information is diffused to the population generally through the use of mass media, while in other cases situations are established so that farmers can be instructed specifically about innovations. Traditional adoption research has not yet clearly differentiated between the mass dissemination of information and the specific instructional situation, in the analysis of farmers' use of information sources. The sub-categories in this classification are as follows:

Personal: direct face-to-face communication between the communicator and the receiver. This category contains the same sources of information as that in the preceding system.

Mass: information media directed to farmers in general and in which there is no provision for two-way communication.

Instructional Group: educational activities in which information is presented to a number of farmers simultaneously and in which there is an opportunity for two-way communication.

Individual Instructional: educational activities conducted with one farmer at a time, such as farm visits by the District Agriculturist.

Information Processes Used by Stage in the Adoption Process

At the awareness stage, the mass sources were the most important and constituted about 55 percent of all the sources reported. This use of mass sources showed a sharp decline to the interest stage, followed by a gradual drop in use to the trial stage and no use of mass sources reported at the adoption stage. This use pattern of mass sources is consistent with previous research.[9] Instructional-group sources were reported as constituting about five percent of the sources used at the awareness stage, but they declined thereafter to the trial stage and were not reported at the adoption stage. From the interest to the trial stage, mass and instructional-group sources accounted for less than nine percent of the sources used.

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[9] Lionberger, *op. cit.* pp. 25 - 32.

Individual-instructional sources were reported at the awareness stage as being about 15 percent of the sources used. This increased at the interest stage to some 45 percent, declined at the evaluation stage, increased again at the trial stage, and finally declined again at the adoption stage. Personal sources constituted 25 percent of the sources at the awareness stage and increased steadily through the interest stage to become over 80 percent of the sources used at the evaluation stage. After declining somewhat at the trial stage, personal sources increased again to nearly 95 percent at the adoption stage. Personal and individual-instructional sources together accounted for more than 91 percent of the sources reported from the interest to the trial stages, and made up all of the sources of information used at the adoption stage. These data are illustrated in Figure 1.

The proportional use of the several sources of information, classified by the nature of the activity at each stage in the adoption process, were tested for statistically significant differences. As indicated in Table 8, personal sources were significant in every instance. In order of the frequency of significant differences, the remaining classes were individual instructional, mass, and finally instructional group.

Information Processes Used by Adopter Category

In all adopter categories, the instructional-group sources were reported as least used, followed in turn by mass, individual-instructional, and finally personal sources which were the most used. The laggard category used personal sources more frequently and individual-instructional sources less frequently than any of the remaining adopter categories. The early adopter-innovator category, however, used instructional-group and mass sources slightly more, and personal sources considerably less, than did the other three categories. These data are shown in Figure 3.

Instructional-group sources were least used by the late majority, followed by the laggard; the early majority reported about the same use, while the early adopter-innovator category reported the most use of this source. Mass sources were used at about the same rate by all but the early adopter-innovator category, which reported slightly more use of this source. Individual-instructional sources were used least by laggards, with a slight increase from late to early majority. Personal sources were the most used of all the sources but declined consistently from laggards to early adopter-innovators. There were no statistically significant differences in the proportional use of sources of information classified by the nature of the activity among the adopter categories.

SOURCE USE BY STAGE AND ADOPTER CATEGORY

As a further analysis of the respondents' use of information sources, the use of sources at stages in the adoption process was tested by

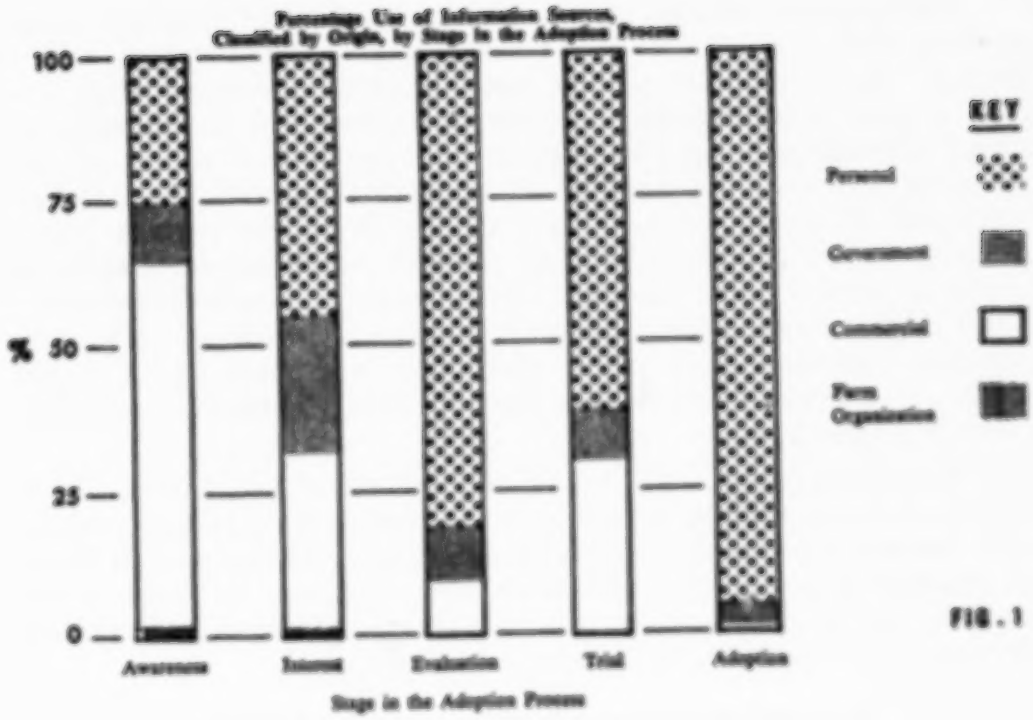
Percentage Use of Information Sources,
Classified by Origin, by Stage in the Adoption Process
100
75
% 50
25
0
Awareness
Interest
Evaluation
Trial
Adoption
Stage in the Adoption Process
KEY
Personal
Government
Commercial
Farm Organization

FIG. 1

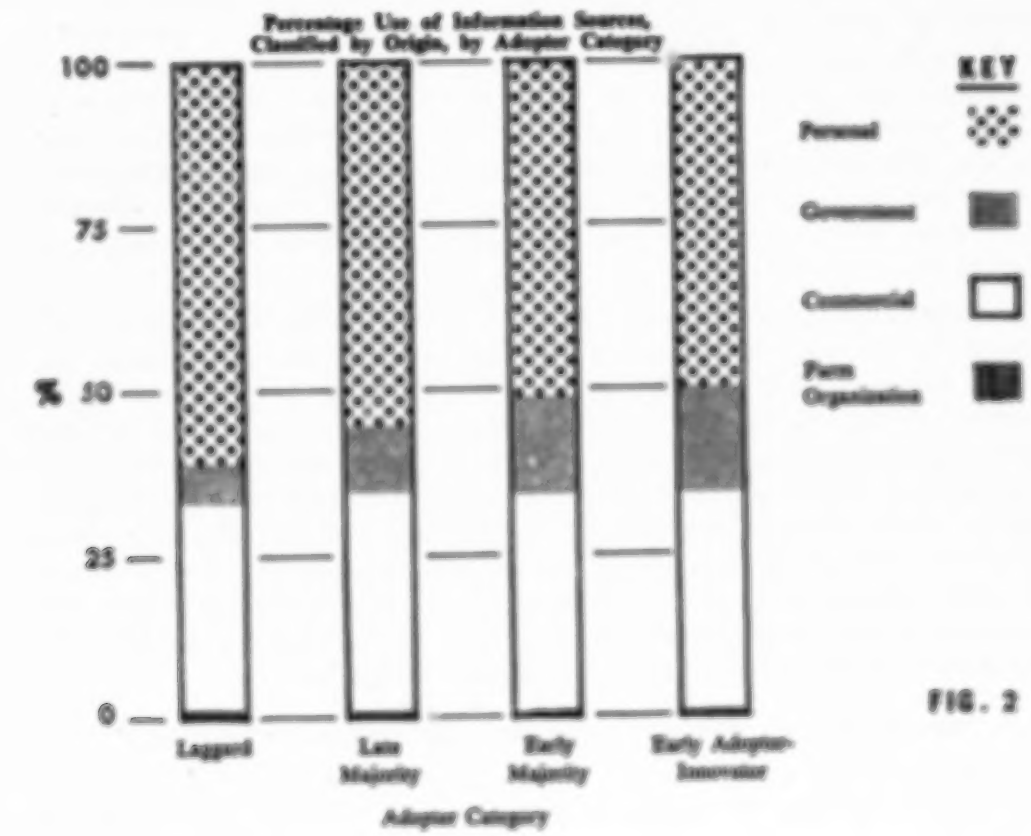
Percentage Use of Information Sources,
Classified by Origin, by Adopter Category
100
75
% 50
25
0
Laggard
Late Majority
Early Majority
Early Adopter-Innovator
Adopter Category
KEY
Personal
Government
Commercial
Farm Organization

FIG. 2

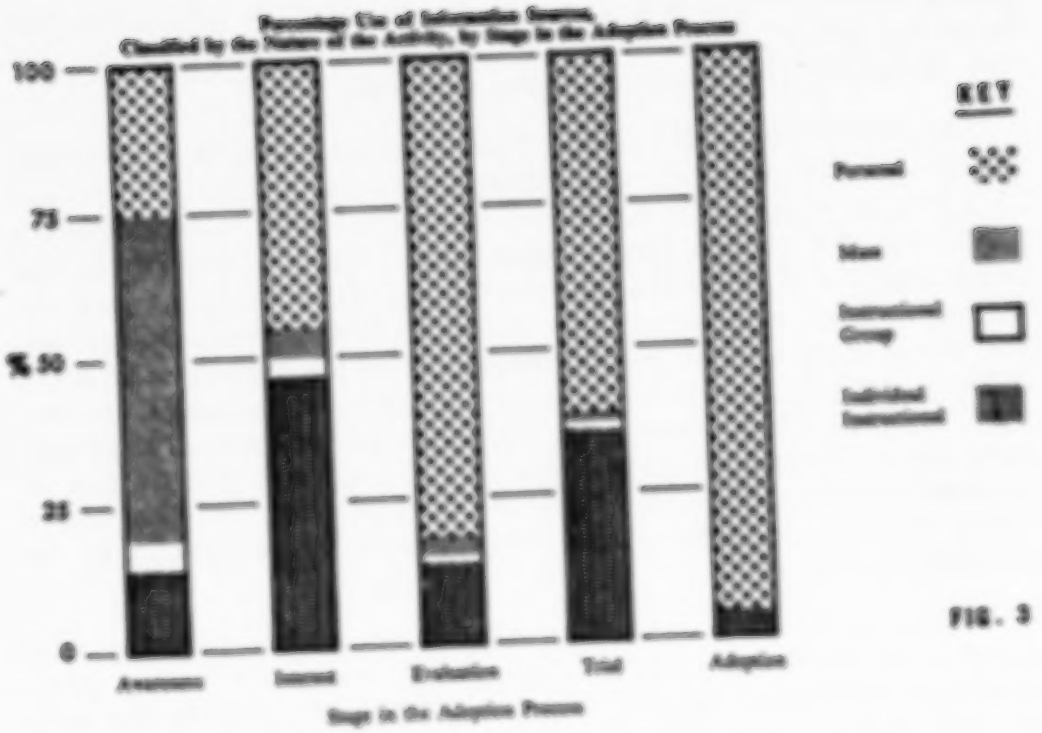
100
75
% 50
25
0
Awareness
Interest
Evaluation
Trial
Adoption
Stage in the Adoption Process
KEY

FIG. 3

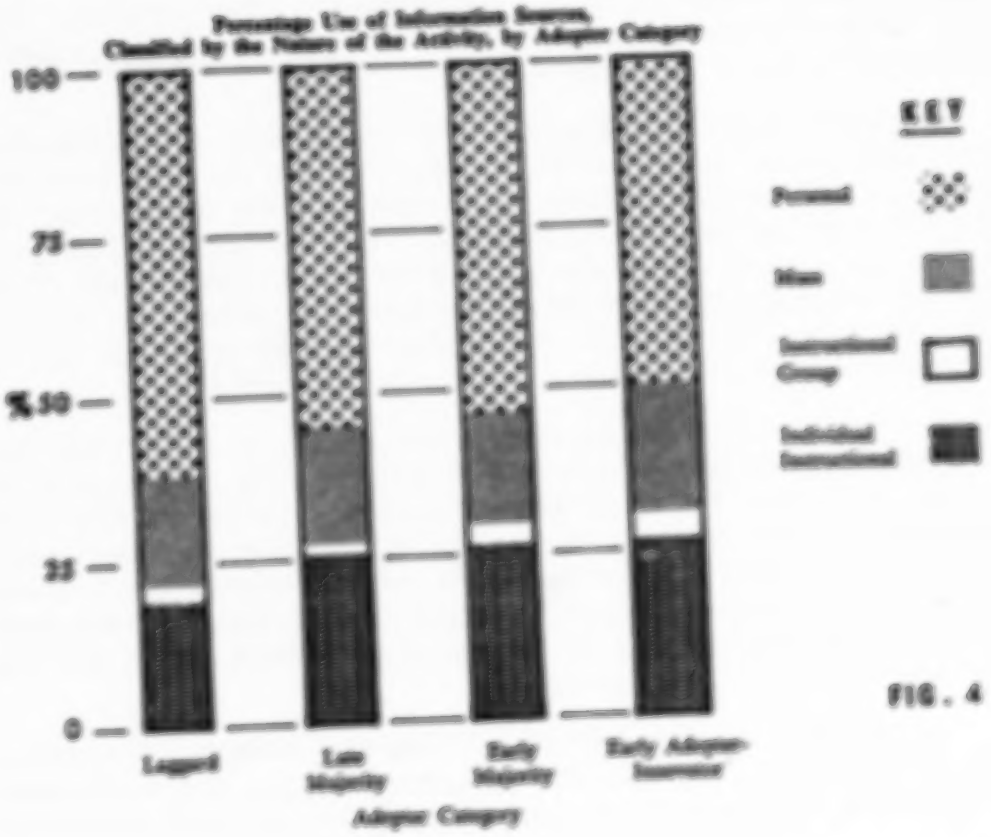
100
75
% 50
25
0
Laggard
Late Majority
Early Majority
Adopter Category
KEY

FIG. 4

adopter categories both with respect to the origin of the information and the nature of the activity by which it was diffused. Statistically significant differences were found in several instances.

In terms of the origin of the information, upon combining all stages and adopter categories, the percentage use of information sources was 55.0 percent personal, 32.3 percent commercial, 12.1 percent governmental and 0.6 percent farm organizational. Thus, a majority of the farmers derived their information from other farmers or their own experience. Farm organizations were the least effective source of information so far as the farmers were concerned. From the point of view of the diffusion process, again 55.0 percent of the farmers depended on personal processes, with 25.1 percent using individual instructional, 17.4 percent mass means of communication and only 2.5 percent participating in instructional-group activities. There were statistically significant differences, however, between adopter categories at various stages in the adoption process.

None of the differences in source use by adopter category were found to be significant at the awareness stage, but at the interest stage, significant differences occurred between the laggard and both the early majority and the early adopter-innovator categories. In both cases the laggards used personal sources more than did the other categories. The early adopter-innovator group used individual-instructional sources significantly more than did the laggards.

The early majority used personal sources less often at the evaluation stage than did the laggards or the late majority. On the other hand, the early majority used mass sources more often than did the laggards. At the trial stage, the laggards showed a significantly greater use of personal sources and a lesser use of individual-instructional sources than did either the late majority or the early adopter-innovator categories. At the adoption stage, there were no statistically significant differences in the differential use of information sources by adopter category.

Laggards used government sources significantly less at the awareness and interest stages than did the early majority and the early adopter-innovator categories. The use of personal sources at the interest stage was significantly greater among laggards. The early majority used government sources almost three times as much and personal sources less than did the laggards or the late majority at the evaluation stage. At the same time, the early majority made greater use of commercial sources than did the early adopter-innovator group.

At the trial stage, the early adopter-innovator category made greater use of government and commercial sources but less use of personal sources than did the laggards. The late majority also used commercial

sources of information more and personal sources less than did the laggards. The variations in the use of sources at the adoption stage was not significantly different among the adopter categories.

USE OF INDIVIDUAL SOURCES OF INFORMATION

An examination of the individual sources of information reported by the sample shows some slight variations in the principal sources used by stages in the adoption process and by adopter categories. In both cases, the three most important sources were, in order, friends and neighbors, the observation of other farms, and salesmen and dealers. Beyond these three principal sources, there was greater variation with respect to stages in the adoption process, as illustrated in Table 8 and by adopter category in Table 9.

This use of individual sources of information is not wholly consistent with previous research. Lionberger[9] indicated that mass media were most important at the awareness and interest stage whereas the present study shows friends and neighbors to be most important at the interest stage. This study is in agreement with Lionberger's for the evaluation and trial stages, but at the adoption stage he listed friends and neighbors while own experience ranks first here. With respect to adopter categories, this study lists friends and neighbors first for all categories, whereas Verner and Millerd found this so only for laggards, with the District Horticulturist first for the other categories. Salesmen and dealers did not rank among the first five reported by Verner and Millerd, whereas it ranks third in the present list. Again, these differences are undoubtedly the result of the differing situations of the two populations.

SOURCE USE BY INNOVATION GROUPS

As noted earlier, the 10 innovations were divided into two groups in terms of certain common characteristics. From the analysis by innovation groups, it is clear that the more complicated the innovation, the greater the number of information sources used. Group 1 innovations, which are generally less complex, involved a total of 148 information sources used for all innovations in the group, and this averaged 1.48 source per respondent. Group 2 innovations, on the other hand, are more complicated and a total of 288 information sources were used at an average of 2.88 per respondent.

Sources by Origin

In the classification of the sources of information by origin, there were no observed differences in the use of sources between group 1 and

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[9] Lionberger, op. cit. pp. 23 - 32.

TABLE 8

The Five Most Frequently Used Sources of Information by Stage in the Adoption Process

Awareness %	Interest %	Evaluation %	Trial %	Adoption %	All Stages Combined %
General farm magazines 21.9	Neighbors and friends 22.8	Neighbors and friends 28.2	Neighbors and friends 30.0	Own experience 32.7	Neighbors and friends 24.5
Special dairy magazines 16.9	Observation of other farms 19.6	Observation of other farms 25.5	Observation of other farms 29.0	Neighbors and friends 23.7	Observation of other farms 20.9
Neighbors and friends 14.3	Salesmen and dealers 17.0	Salesmen and dealers 6.3	Salesmen and dealers 26.9	Observation of other farms 17.2	Salesmen and dealers 11.6
Observation of other farms 9.3	District Agriculturist 14.1	Own experience 6.0	District Agriculturist 6.2	District Agriculturist 2.7	Own experience 7.7
Radio 8.8	Milk monitor Additives 5.8	District Agriculturist 4.4	Visits to experimental farm 1.7	Milk, additives or vitamins 1.6	General farm magazines 6.9
TOTAL 71.2	79.3	90.4	93.8	95.9	71.6

TABLE 9

The Five Most Frequently Used Sources of Information by Adopter Category

Source	Category: Laggard	Late Majority	Early Majority	Early Adopter Innovator
Neighbors and friends	27.6	25.9	23.5	20.8
Observation of other farms	22.6	20.7	21.3	18.2
Salesmen and dealers	11.1	11.8	11.4	12.3
Own experience	8.6	7.1		9.3
General farm magazines	7.2	6.8		
District Agriculturist			7.1	7.6
Own experience or general farm magazines*			7.0	

* Both these sources have the same frequency of use for the early majority.

group 2 innovations. Commercial and personal sources in that order were the principal sources used, while government and farm organizations had so little use reported as to be insignificant.

By Nature of the Activity

The least used source of information for both group 1 and group 2 innovations was the instructional-group source. This was the only category common to both groups. The most used source in group 1 was that of mass sources, which ranked second in group 2. The most used source for group 2 innovations was personal sources, which ranked third for group 1. Individual-instructional sources ranked second for group 1 and third for group 2. Since group 2 innovations were somewhat more difficult than those in group 1, personal sources were most important, while the easier group 1 innovations depended upon mass media.

REVIEW

Under both classification schemes and in most analyses, the personal sources were the most important, particularly from the interest to the adoption stage. Commercial and mass sources were the most important at the awareness stage, with individual-instructional and government sources ranking next to personal sources in use from the trial to the adoption stage. Group-instructional and farm organizations were generally the least important of the sources reported.

Although this analysis indicates the most important sources of information reported by this specific population, it does not evaluate the intrinsic worth of the sources. This is particularly true for instructional-group sources, which were rarely reported by this population. The farmers in the Lower Fraser Valley have little contact with their District Agriculturist, as shown earlier, and there are few educational programs provided for them. As indicated here, the dairymen must depend upon their own resources to a great extent in order to acquire information about innovations. This is borne out by the consistent importance of personal sources of information.

In many respects, the use of information sources reported here is consistent with adoption research generally, but it does differ from the results of the research reported by Verner and Millerd, who showed that participation in educational programs was a significant variable related to the adoption of innovations. Furthermore, they found that instructional activities were important sources of information.

Any increase in the availability of instructional-group activities for dairymen in the Lower Fraser Valley would probably alter the use of information sources as reported here. At the moment, none of the agencies in the area appear to be making any intensive effort to provide educational opportunities for dairymen.

Chapter 4

Adoption and Non-Adoption

The acceptance or rejection of an agricultural innovation often involves a lengthy and complex process of decision making on the part of the farmer, in which he must consider the innovation itself and its suitability in terms of his own operations. The farmer will be influenced by the simplicity or complexity of the innovation itself, and the 10 innovations studied here have been divided into two groups on that basis. In group 1 are those innovations which are relatively simple to adopt, while group 2 includes those which are more complex. There are five innovations in each group. In addition, there are certain characteristics of innovations which influence the farmer's decision to accept or reject. These include relative advantage, compatability, complexity, divisibility, and communicability, as discussed in Chapter 1.

Factors which might influence a farmer's decision that stem from his own situation include such things as insufficient capital, the scale of his operation being too small to justify the innovation, or lack of relevance to his operations, and finally a number of other factors relevant only to the farmer in his specific situation, as discussed previously.

In analyzing the adoption process, three related aspects of the process were examined. The progress toward adoption was considered first, in order to assess differences among the adopter categories and to determine reasons for delaying in the decision-making process. The innovation response state was determined and analyzed by adopter category and the element of time spent in the adoption process was measured. Finally, the reasons expressed by the farmer for rejecting or discontinuing an innovation were analyzed.

PROGRESS TOWARD ADOPTION

Information about the ten innovations studied had been diffused to this population for some time; nevertheless, more dairymen were unaware of the innovations than had adopted them. On the average, each respondent was unaware of 2.19 and had adopted 1.86 of the 10 innovations. The degree of unawareness was much higher for the group 1 innovations than for those in group 2, and adoptions were greater in group 2 than in group 1.

By stages in the adoption process, each respondent was at the awareness stage for an average of 2.51 innovations, at the interest stage for 0.30, at the evaluation stage for 2.53 and at the trial stage for 0.61 of the innovations. Again, group 2 exceeded group 1 at every stage except the trial stage, where the average number of respondents was 10.0 for group 1 compared with 2.2 in group 2.

The percentage of respondents at each stage in the adoption process by adopter category is shown in Table 10, which points up the increasing progress toward adoption from the laggard to the early adopter-innovator categories.

TABLE 10

Percentage of Respondents at Each Stage of Adopter Category for All Innovations

	Adoption Category			
Stage Reached	Laggard %	Late Majority %	Early Majority %	Early Adopter-Innovator %
Not aware	38.0	24.8	16.9	7.5
Awareness	35.5	30.7	21.4	10.0
Interest	4.0	2.8	2.9	2.5
Evaluation	16.5	23.4	28.3	33.1
Trial	1.5	3.8	8.2	11.3
Adoption	4.5	14.5	22.3	35.6
Total	100.0	100.0	100.0	100.0

Note: A chi-square value of 81.07 was obtained. This is significant at the .001 level.

On the average, the laggard category remained in the adoption process less than one year for most innovations, while the early adopter-innovator category remained in the adoption process one year or more for more innovations than did the other categories. These data are presented in Table 11.

These data seem to indicate that less time was spent at the interest and trial stages of the adoption process than in the other stages. A number of prior studies have shown that the awareness to trial period is longer than the trial to adoption period; however, it is shorter for earlier adopters than for later adopters.

On the other hand, the trial to adoption period is longer for the relatively earlier adopters than for the later adopters. Thus, the present study appears to be consistent with other research in this area.

TABLE 11

Average Number of Innovations for Which Less Than One Year and One or More Years Was Spent in the Adoption Process, by Adopter Category

Time Spent in the Adoption Process	Adopter Category			
	Laggard	Late Majority	Early Majority	Early Adopter-Innovator
Less than one year	5.32	4.91	4.40	4.19
One or more years	4.68	5.09	5.60	5.81
Total number of innovations	10.00	10.00	10.00	10.00

NOTE: The number of respondents in each adopter category who had entered the adoption process was used as the basis for determining the figures given in this table.

Reasons for Delays in the Adoption Process

If a respondent spent more than two years in the adoption process, this was considered to constitute a delay in proceeding through the process. This time period may have been too short since Beal and Rogers[1] show a nine-year range in the reported time of awareness for one innovation, and Rogers[2] notes that the length of the adoption period varies with different innovations. On the other hand, the stipulated time period of more than two years to constitute a delay may have been too long, since the total number of reasons for delay was quite low and a stipulation of one year instead of two would have produced a greater number of responses. Only two of the 10 innovations appear to have required more than two years.

Situational factors were reported as reasons for delay more frequently, as indicated in Table 12.

Differences existed among the adopter categories with respect to delay and reasons for the delay in proceeding through the adoption process. As shown in Table 13, the laggard group had the lowest average number of innovations which were delayed, while the early adopter-innovator category had the highest average number of innovations. In terms of the reasons for the delay, situational factors were reported most frequently by all adopter categories and the early majority reported more situational factors while the laggards reported the fewest. On the other hand, the laggards reported characteristics of the innovation most often while the early adopter-innovator group gave these reasons less often than other categories.

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[1] Beal and Rogers, *op. cit.* p. 8.

[2] Rogers, *op. cit.* p. 105.

TABLE 12

Frequency Distribution of Reasons for Delay in Proceeding Through the Adoption Process for all the Innovations Combined

Reasons		Frequency %
By Characteristics of the Innovation		
Relative advantage		10.9
Compatibility		1.9
Complexity		0.0
Divisibility		0.0
Communicability		17.9
	Sub-total	30.7
By Situational Factors		
Situation not appropriate		2.6
Scale of operation too small		12.2
Insufficient capital		18.6
Other situational factors		35.9
	Sub-total	69.3
Total for both groups of reasons		100.0

TABLE 13

Percentage Distribution of Reasons for Delay in Proceeding Through the Adoption Process by Adopter Category

	Adopter Category				
Reasons	Laggard %	Late Majority %	Early Majority %	Early Adoption-Innovator %	Total %
By characteristics of the innovation	46.7	32.6	27.0	28.1	30.8
By situational factors	53.3	67.4	73.0	71.9	69.2
Total	100.0	100.0	100.0	100.0	100.0
Average number of innovations for which respondents delayed	0.8	1.6	1.8	2.0	1.6

Note: A chi-square value of 8.42 was obtained. This is significant at the .05 level.

The two classes of reasons were about equally important for the laggard category, but for the other three groups the ratio between the two types of reasons indicates that situational factors were more than twice as important.

INNOVATION RESPONSE STATE

At any given moment in the period following the introduction of an agricultural innovation, a farmer may be considered to be in one of five innovation response states, as follows:

Unawareness: the farmer has not heard of the innovation and knows nothing about it.

Continuation: the farmer knows of the innovation and is at some stage in the adoption process between awareness and adoption, but he has not yet made a decision.

Rejection: the farmer has considered the innovation and rejected it for some reason that is valid to him.

Adoption: the farmer has decided to incorporate the innovation into his operations.

Discontinuance: the farmer adopted the innovation but after a period of use decided to discontinue using it.

This aspect of the adoption process has not been studied extensively; consequently, there is little research to which these data can be related.

Response by Adopter Category

There are distinctive differences among the adopter categories with respect to the five response states. In the main, the early adopter-innovator category lies at one end with the laggards at the other, as shown in Table 14. Variations in response states also differ with respect to the distribution within a single adopter category. In the laggard category, the percentage at each response state ranges from rejection through unawareness to continuation, then adoption and finally to discontinuance in that order. In the early adopter-innovator category, the distribution from highest to lowest percentage responses is rejection, adoption or discontinuance, continuation, and finally unawareness. Different sequences of response states are encountered in the remaining two categories.

Time and Response State

The time spent in the adoption process for each response state shows that on the average a decision to reject an innovation was made in a

TABLE 14

Percentage Distribution of Respondents by Adopter Category and Innovation Response State

Innovation Response State	Adopter Category			
	Laggard %	Late Majority %	Early Majority %	Early Adopter-Innovator %
Unaware	38.0	24.8	16.9	7.5
Continuing with the adoption process	12.0	16.6	16.0	18.1
Rejection	45.5	44.1	44.8	38.8
Adoption	4.0	13.8	20.9	28.1
Discontinuance	0.5	0.7	1.4	7.5
Total	100.0	100.0	100.0	100.0

NOTE: A chi-square value of 51.76 was obtained. This is significant at the .01 level.

TABLE 15

Percentage Distribution of Time Spent in the Adoption Process by Innovation Response State

Innovation Response State	Time Spent in the Adoption Process		
	Less than One Year %	One or More Years %	Total %
Continuing with adoption process	7.6	92.4	100.0
Rejection	64.4	35.6	100.0
Adoption	31.9	68.1	100.0
Discontinuance	80.0	20.0	100.0

NOTE: A chi-square value of 127.54 was obtained. This is significant at the .01 level.

shorter period of time than was the decision to adopt. Similarly, the decision to continue involves more time than the decision to discontinue. This distribution is reported in Table 15.

Response by Innovation Group

The number of respondents continuing, rejecting, or adopting was lower for the group 2 innovations than for those in group 1. On the other hand, unawareness and discontinuance were higher with group 1 than group 2. The average percentage response for all 10 innovations showed the order of importance to be rejection, unawareness, adoption, continuance, and finally discontinuance. The average number of innovations

per respondent in each class followed the same order and ranged from 4.38 rejections, 2.19 unawareness, 1.66 adoption, and 1.57 continuation, to 0.20 discontinuance.

The results reported here regarding innovation response states are not directly comparable with previous research. Silverman and Bailey[5] found that farmers dropped one practice for every two they adopted, while Johnson and Van den Ban[6] found that during a five-year period 176 Wisconsin farmers made 266 adoptions and 255 discontinuances of 17 innovations. Of the 10 innovations studied here there were 1.66 adoptions to 0.20 discontinuances.

REASONS FOR REJECTION AND DISCONTINUANCE

Although an agricultural innovation may be recommended to farmers on the basis of scientific evidence to support its acceptance, farmers

TABLE 16

Percentage Distribution of Reasons for Rejection and Discontinuance by Innovation Group

Reasons	Group 1 Innovations %	Group 2 Innovations %	All Innovations %
By characteristics of the innovation			
Relative advantage	95.5	41.2	65.3
Compatibility	1.5	2.7	2.2
Complexity	1.0	1.6	1.3
Divisibility	0.0	0.0	0.0
Communicability	0.0	0.0	0.0
Total	98.0	45.5	68.8
By situational factors			
Situation not appropriate	0.5	24.7	14.0
Scale of operation too small	0.0	29.0	16.1
Insufficient capital	0.0	0.0	0.0
Other situational factors	1.5	0.8	1.1
Total	2.0	54.5	31.2
Total of all reasons	100.0	100.0	100.0

[5] L. J. Silverman and W. C. Bailey, *Trends in the Adoption of Recommended Farm Practices — Alcorn County, Mississippi.* Bulletin 617. AES, Mississippi State University, April 1961. p. 8.

[6] Donald E. Johnson and Anne W. van den Ban, "The Dynamics of Farm Practice Change". Cited in Rogers, *op. cit.* p. 90.

do not always use this as the basis for acceptance, rejection, or discontinuance. McMillion[5] and Sheppard[6] both found that reasons given by farmers for rejecting practices usually showed a definite lack of knowledge regarding the value of the practice. Hoffer and Strangland[7] indicated that the attitudes and values of the farmer were the most important factors influencing rejection, but that factors such as size of farm or the cost of the innovation were also important.

As noted earlier, the reasons for rejection or discontinuance used in this study relate to the characteristics of the innovation and to the individual farmer's own particular situation. In these terms, then, 68.8 percent of the expressed reasons were due to the characteristics of the innovation and 31.2 percent to situational factors. Extreme differences were encountered when the reasons were analyzed by innovation group. For group 1 innovations, the characteristics of the innovation accounted for 98 percent of the reasons with only 45.5 percent so reported for group 2. On the other hand, situational factors accounted for only two percent in group 1 and 54.5 percent in group 2. The distribution of reasons for rejection and discontinuance by innovation group for the subclassification of reasons is given in Table 16.

TABLE 17

Percentage Distribution of Reasons for Rejection and Discontinuance of Innovations by Adopter Category

	Adopter Category			
[illegible] → Reasons	Laggard %	Late Majority %	Early Majority %	Early Adoption Exemption %
Characteristics of the innovation	62.0	68.5	68.5	78.4
Situational factors	38.0	31.5	31.5	21.6
Total percent	100.0	100.0	100.0	100.0

[5] M. B. McMillion, *The Sources of Information and Factors Which Influence Farmers in Adopting Recommended Practices in Two New Zealand Counties.* Lincoln College, University of New Zealand, July, 1960. Technical Publication No. 19, p. 31.

[6] D. Sheppard, "Farmers' Reasons for Not Adopting Controversial Techniques in Grassland Farming". *Journal of the British Grassland Society*, 16:13 (March, 1961).

[7] C. R. Hoffer and D. Strangland, "Farmers' Attitudes and Values in Relation to Adoption of Approved Practices in Corn Growing." *Rural Sociology*, 23:112 - 120 (1958).

Reasons by Adopter Category

The reasons for rejection and discontinuance vary among the adopter categories; however, the late and early majority categories show the same distribution while the laggard and early adopter-innovator categories represent the two extremes. These data are provided in Table 17. The differences in reasons between adopter categories were not statistically significant.

Reasons by Stage

The awareness and evaluation stages had the greatest number of rejections, and in both cases situational factors provided the principal reasons. The fewest rejections occurred at the interest and trial stages where the reasons were due largely to the innovation. Innovations due to be rejected because of situational factors tended to be rejected before the trial stage. This indicates that the farmers were better able to judge their own situational factors than they were the innovation. These data are presented in Table 18.

TABLE 18

Percentage Distribution of Reasons for Rejection by Innovation Group, by Stage in the Adoption Process

Reasons for Rejection	Stage				
	Awareness %	Interest %	Evaluation %	Trial %	Total %
Characteristics of the innovation	43.3	1.0	36.6	16.1	100.0
Situational factors	53.6	0.7	44.3	1.4	100.0

Rejection by Time

Rejections of group 1 innovations were almost wholly due to the characteristics of the innovation while with group 2 innovations the rejections were more nearly equal; however, situational factors accounted for the greater number of rejections. Most of the rejections in both groups occurred in less than one year, with no rejections of group 1 innovations due to situational factors occurring after one year. When the rejection of group 2 innovations occurred after one year, the reasons were almost equally divided between the innovation and the situation. It appears that farmers can make a decision to reject quicker for group 1 innovations than for group 2. Furthermore, it is easier to make a decision regarding group 1 innovations than it is for those in group 2.

TABLE 19

Percentage Distribution of Reasons for Rejection and Discontinuance by Innovation Group and Time Spent in the Adoption Process

	Characteristics of Innovation		Situational Factors		
	Less than one year %	One or more years %	Less than one year %	One or more years %	Total %
Group 1 innovations	69.9	28.1	2.0	0.0	100.0
Group 2 innovations	25.9	19.6	33.7	20.8	100.0

NOTE: A chi-square value of 70.67 was obtained. This is significant at the .01 level.

Chapter 5

Conclusions

In most respects, the adoption behavior of dairy operators in the Lower Fraser Valley is not strikingly different from that observed among farmers in general. However, there are some characteristics identified as significant in this study which are at variance with other research.

ADOPTION

There were few socio-economic characteristics that correlated with the adoption score at a statistically significant level. The two personal characteristics showing a relationship that was positive were the enjoyment of dairying and the amount of social participation, while negative relationships were found with number of years on the present farm and the number of children. Among the economic characteristics studied, positive relationships were found to exist between the number of young dairy stock raised and the family-farm plus off-farm income. A negative relationship was indicated between income from other farm enterprises and the adoption of dairy innovations. Finally, a positive correlation existed between visits to the District Agriculturist in his office and adoption score, which indicates the search for information and assistance by the farmer; however, a negative relationship was found between adoption score and farm visits by the District Agriculturist, which suggests that he is not a prime source of information on dairy innovations and does not take such information to the farmer.

In any event, the partial correlation coefficients were low even though they were statistically significant, which suggests that there might be other factors not identified here influencing the results. The dairy operator who adopts innovations related to dairying is one who enjoys his work and concentrates his energies and activities on his dairy enterprise. He has a smaller family and is not long established but he is active in the community. He tends to be more prosperous and he actively seeks information about improved practices rather than waiting for it to come to him.

Socio-economic Characteristics

Although not related specifically to adoption, there are differences between some of the characteristics of the population studied here and

that reported in other research studies. Age was not related to adoption nor did it differentiate between the earlier and later adopters, as Rogers[1] suggested when he noted that "... earlier adopters are younger in age than later adopters." The data presented here are consistent with the role of age in adoption reported by Verner and Millerd[2] in their study of orchardists in British Columbia.

Years of school completed as the measure of educational level was not related to adoption in this study, and there is very little agreement on this point in the research literature. Photiadis[3] showed that when social and economic variables were controlled, educational level was not related to adoption. Lionberger,[4] on the other hand, suggested that the kind of schooling appeared more important than the amount. This was supported by Verner and Millerd,[5] who indicated that the recency of the educational experience and the relevance of the content to the particular social system were the important attributes of education. The present study substantiates this to some extent, in that agriculture courses in vocational school were a significant variable in differentiating among the four adopter categories.

The enjoyment of dairying was related to adoption and it differentiated between the earlier and the later adopters. Verner and Millerd[6] found that 79.3 percent of the Okanagan orchardists enjoyed their work very much, compared with 60 percent of the dairymen, while 1.4 percent of the orchardists did not enjoy their work at all, as against 14 percent of the dairymen. In that study, the enjoyment of orcharding was significant for four adopter categories, while the enjoyment of dairying in this one was associated only with two adopter categories.

Among dairymen, a significantly smaller percentage of earlier than later adopters had 20 or more years of farming experience. This is the opposite of this situation among orchardists, where the earlier adopters had more experience than the later adopters.[7] Although social participation had a positive relationship to adoption score, it did not differentiate among the adopter categories. This differs from Lionberger's[8] statement that the earlier adopters participate more than do later adopters.

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[1] Rogers, *op. cit.* p. 313.

[2] Verner and Millerd, *op. cit.* p. 9.

[3] J. D. Photiadis, "Motivations, Contacts and Technological Change." *Rural Sociology* 27:324 - 325 (December 1962).

[4] Lionberger, *op. cit.* pp. 17 and 97.

[5] Verner and Millerd, *op. cit.* pp. 73 - 74.

[6] *Ibid.* p. 19.

[7] *Ibid.* pp. 19 - 20.

[8] Lionberger, *op. cit.* pp. 38 - 40.

Rogers[9] noted that earlier adopters have more specialized operations than do later adopters. This was not found in this study. Even with four-fifths of the dairymen having no improved land devoted to non-dairying, there was no significant difference among adopter categories or in terms of income from non-dairying activities.

The median number of cows in the milking herd was low, and this was positively associated with other variables, particularly the amount of farm plus off-farm employment income. This is consistent with the economic study by Crossfield and Woodward[10] made some six years ago on the same population.

The District Agriculturist

The role of the District Agriculturist in the adoption of dairy innovations is somewhat anomalous. Twelve percent of the dairy operators had no contact of any kind with the District Agriculturist; however, the dairymen in general had an average of 2.53 types of contact in the year preceding the study, which compares favorably with the 2.41 types of contacts reported by Rogers and Capener,[11] in their study of the contacts of farmers with agricultural extension agents in the United States. The range in the number of types of contact between the laggard and early adopter-innovator categories was 1.33 among dairymen, compared with 1.81 recorded by Rogers and Capener.[12] These measures are quantitative rather than qualitative and include everything from farm visits to radio broadcasts; therefore, they provide no real measure of the relevance of contact to adoption.

Contacts between dairymen and the District Agriculturist are impersonal (as through mail, radio, or newspaper announcements) or personal (as is the case with office visits, farm visits, or attendance at meetings and field days). The impersonal contacts reach more dairymen than do the personal contacts, as one might expect. The Canadian-born farmers who are long established in the community and who are more prosperous have more contacts with the District Agriculturist by mail, telephone calls, office visits, and farm visits; however, they are not necessarily the most progressive and, in fact, are less apt to adopt innovations. The recent immigrant, on the other hand, who is not well established in the community, has to seek out the District Agriculturist through telephone calls or office visits in order to get from him the in-

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[9] Rogers, *op. cit.* p. 313.

[10] D. C. Crossfield and E. D. Woodward, *Dairy Farm Organizations in the Fraser Valley of British Columbia, 1961.* Vancouver: Economics Division, Canada Department of Agriculture, 1962. p. 17.

[11] Rogers and Capener, *op. cit.* p. 14.

[12] *Ibid.* p. 25.

formation needed to improve his operations. A significantly higher percentage of the earlier than the later adopters make visits to the District Agriculturist in his office, and such visits are significantly related to adoption.

Those farmers whom the District Agriculturist seeks out through farm visits have a lower adoption score, while those who seek him in his office have a higher adoption score. This suggests that the District Agriculturist is not an important influence in the diffusion of dairy innovations to dairy operators. This is supported further by the fact that contacts with the District Agriculturist were reported as constituting 0.4 percent or less of all of the sources of information used for all of the innovations studied. This is contrary to the data provided by Rogers and Capener,[13] who found that farmers with higher adoption scores made significantly greater use of the county extension agent as a source of information.

This relationship between the District Agriculturist and the dairy operators follows the general trend of the agricultural extension services across Canada, in which personal contacts are decreasing and impersonal contacts increasing, as has been determined by Keesing.[14] There is ample reason to question the efficacy of this trend, as noted by Verner.[15]

SOURCES OF INFORMATION

The dairy operators used different sources of information at different stages in the adoption process. Mass sources were most important at the awareness stage, which is in agreement with previous research. At the interest stage, individual instructional sources were slightly more important than personal sources, which differs from Lionberger's[16] conclusion that mass sources are most important at the interest stage also. Verner and Millerd[17] found mass sources of information to have a lower frequency of use than other sources at the interest stage too. For the remaining stages in the adoption process, personal sources were of paramount importance. Commercial sources were most important at the awareness stage, government sources had their greatest use at the interest stage, and farm organization sources were little used at any stage.

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[13] *Ibid.* pp. 24 - 25.

[14] Paul B. Keesing, "A Study of Provincial Agricultural Extension Services in Canada 1952 - 1961" M.S.A. thesis. U.B.C., 1965.

[15] Coolie Verner, "Discussion" in: *Rural Canada in Transition.* Edited by W. J. Anderson and M. A. Tremblay. Ottawa: Agricultural Economics Research Council of Canada, 1966. pp. 219 - 224.

[16] Lionberger, *op. cit.* pp. 26 and 32.

[17] Verner and Millerd, *op. cit.* pp. 38 - 41.

For the most part, the dairy operators in the Lower Fraser Valley are largely a neglected group as far as the diffusion of information about new and improved practices is concerned. Neither the provincial department of agriculture nor the farmers' organizations are working effectively to promote the adoption of innovations. Salesmen and dealers actively promote commercial products, but there is virtually nothing done of an educational nature involving improved practices. The dairy operators must depend upon themselves and each other to find out about new practices and in making decisions respecting their use. This is accentuated by the report that general farm magazines constitute 22.7 percent of the sources of information used for all innovations studied. These were followed in order by neighbors and friends at 20.5 percent and special dairy magazines at 16.8 percent, while none of the major governmental or farm organization sources exceeded 5 percent in use. In this respect, the dairy operators are quite different from the orchardists as reported by Verner and Millerd,[18] who found that the District Horticulturist ranked first followed by other orchardists and the local governmental research station.

ADOPTION AND NON-ADOPTION

There were more dairymen not aware of the 10 innovations studied than had adopted them. This is undoubtedly related to the diffusion of information discussed above. An analysis of the innovation-response state showed that, on the average, each respondent was not aware of 2.19 of the 10 innovations, was continuing in the adoption process for 1.57, rejected 4.38, adopted 1.66, and discontinued 0.20 innovations.[19]

Continuation, rejection, and adoption were lower while unawareness and discontinuance were higher for the innovations classified in group 1 than for those in group 2. Since both the number of sources of information used and the adoption rate were about twice as high for the group 2 as for group 1 innovations, the statement by Rogers[20] that a high relationship exists between exposure to a new idea and its adoption is supported.

Almost half of the rejections occurred at the awareness stage; consequently, decisions to reject were made at the time the farmer first learned of an innovation. This indicates that the sources of information failed to motivate the dairymen to seek further information before reaching a decision. It also reflects the absence of educational programs designed to achieve a more rational approach to the adoption process. The decision to reject was made in a shorter time than the decision to adopt an

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[18] *Ibid.* p. 47.

[19] This ratio of discontinuance to adoption is considerably lower than that reported by Johnson and Van den Ban, *op. cit.* and opposite to that reported by Silverman and Bailey, *op. cit.*

[20] Rogers, *op. cit.* p. 104.

innovation. Discontinuances were greater as time spent in the adoption process was lessened. This suggests that adoptions made in haste were more apt to be abandoned later.

About two-thirds of the reasons given for rejection and discontinuance related to the characteristics of the innovation, and one third to factors in the dairyman's own situation. The reasons for delaying in the adoption process were just the opposite of this. From the laggard to the early adopter-innovator category, the characteristics of the innovation increased while situational factors decreased as reasons for rejection and discontinuance. Thus, the higher categories were more apt to find the innovation unacceptable while the lower categories found it not suitable in their own situations.

Since little research has been done on this aspect of the adoption process, it is not possible to relate these results to research; however, they do tend to substantiate the reports by both McMillion[21] and by Sheppard[22] that rejection frequently shows a lack of knowledge about the value of the innovation.

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[21] McMillion, *op. cit.* p. 31.

[22] Sheppard, *op. cit.* p. 13.

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APPENDIX

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TABLE 1

Z Values for the Difference Between Stages in the Adoption Process in the Use of Information Sources Classified by Nature of the Activity

Source	Stage			
	Interest	Evaluation	Trial	Adoption
Personal				
Awareness	—2.95**	—8.14**	—5.22**	—10.12**
Interest		—5.52**	—2.37*	— 7.75**
Evaluation			3.28**	— 2.85**
Trial				— 5.76**
Mass				
Awareness	7.66**	8.16**	8.65**	8.80**
Interest		0.89	2.03*	2.44*
Evaluation			1.28	1.80
Trial				0.84
Instructional Group				
Awareness	1.10	1.74	2.18*	2.42*
Interest		0.73	1.28	1.62
Evaluation			0.64	1.10
Trial				0.63
Individual Instructional				
Awareness	—5.12**	0.06	—3.87**	2.11*
Interest		5.18**	1.35	6.76**
Evaluation			—3.93**	2.06*
Trial				5.62**

NOTE: The values followed by asterisks are significant. The test of significance of the difference between two proportions was used with the null hypothesis that there was no difference in the use of a source between stages at the .05 level of significance.

* Significant at the .05 level.

** Significant at the .01 level.

TABLE 2

Z Values for the Difference Between Stages in the Adoption Process in the Use of Information Sources Classified by Origin

Source	Stage			
	Interest	Evaluation	Trial	Adoption
Personal				
Awareness	—2.95**	—8.14**	—5.22**	—10.12**
Interest		—5.52**	—2.37*	— 7.75**
Evaluation			3.28**	— 2.85**
Trial				— 5.76**
Government				
Awareness	—2.38*	0.51	0.53	1.6[illegible]
Interest		2.85**	2.88**	3.87**
Evaluation			0.04	1.19
Trial				1.16
Commercial				
Awareness	4.41**	7.88**	4.61**	9.44**
Interest		3.92**	0.21	5.97**
Evaluation			—3.73**	2.84**
Trial				5.80**
Farm Organization				
Awareness	0.91	1.39	1.39	1.39
Interest		0.71	0.71	0.71
Evaluation			0.00	0.00
Trial				0.00

NOTE: The values followed by asterisks are significant. For a more detailed explanation, see the note following Table 1.

* Significant at the .05 level.

** Significant at the .01 level.

TABLE 3

Percentage Distribution of Amount of Unpaid (Family) Labor by Adopter Category

	Amount of Unpaid (Family) Labor			
Adopter category	Nil %	Less than 27 weeks %	27 weeks or more %	Total %
Laggard	40.0	20.0	40.0	100.0
Late majority	20.7	58.6	20.7	100.0
Early majority	40.0	22.9	37.1	100.0
Early adopter-innovator	12.5	50.0	37.5	100.0
All respondents	30.0	37.0	33.0	100.0

TABLE 4

Percentage Distribution of Family Farm Plus Off-Farm Employment Income by Adopter Category

	Family-Farm plus Off-Farm Employment Income		
Adopter Category	Less than $2,500 %	$2,500 or more %	Total %
Laggard	75.0	25.0	100.0
Late majority	31.0	69.0	100.0
Early majority	40.0	60.0	100.0
Early adopter-innovator	31.3	68.7	100.0
All respondents	43.0	57.0	100.0

TABLE 5

Percentage Distribution of Visits to the District Agriculturist's Office by Adopter Category

	Visits to the District Agriculturist's Office		
Adopter Category	No Visits %	One or More Visits %	Total %
Laggard and late majority	83.7	16.3	100.0
Early majority and early adopter-innovator	66.7	33.3	100.0
All respondents	75.0	25.0	100.0

TABLE 6

Percentage Distribution of Average Production per Cow by Adopter Category

Adopter Category	Average Production per Cow		
	Less than 11,000 pounds %	11,000 pounds or More %	Total %
Laggard	90.0	10.0	100.0
Late majority	55.2	44.8	100.0
Early majority	60.0	40.0	100.0
Early adopter-innovator	50.0	50.0	100.0
All respondents	63.0	37.0	100.0

TABLE 7

Percentage Distribution of Number of Young Dairy Stock Raised by Adopter Category

Adopter Category	Number of Young Dairy Stock Raised			
	Fewer than 10 %	10 to 19 %	20 or More %	Total %
Laggard and late majority	57.1	28.6	14.3	100.0
Early majority and early adopter-innovator	33.3	25.5	41.2	100.0
All respondents	45.0	27.0	28.0	100.0

TABLE 8

Percentage Distribution of Number of Years Farming Experience by Adopter Category

Adopter Category	Number of Years Farming Experience		
	Fewer than 20 years %	20 years or More %	Total %
Laggard and late majority	14.3	85.7	100.0
Early majority and early adopter-innovator	35.3	64.7	100.0
All respondents	25.0	75.0	100.0

TABLE 9

Percentage Distribution of Total Size of Farm by Adopter Category

Adopter Category	Total Size of Farm		
	Fewer than 70 acres %	70 acres or More %	Total %
Laggard	80.0	20.0	100.0
Late majority	48.3	51.7	100.0
Early majority	68.6	31.4	100.0
Early adopter-innovator	37.5	62.5	100.0
All respondents	60.0	40.0	100.0

TABLE 10

Percentage Distribution of Agriculture Courses taken in Vocational School by Adopter Category

Adopter Category	Agricultural Courses Taken in Vocational School		
	Yes %	No %	Total %
Laggard	15.0	85.0	100.0
Late majority	10.3	89.7	100.0
Early majority	2.9	97.1	100.0
Early adopter-innovator	31.3	68.7	100.0
All respondents	12.0	88.0	100.0

TABLE 11

Percentage Distribution of Dairy Farm Work Enjoyment by Adopter Category

Adopter Category	Dairy Farm Work Enjoyment			
	Yes, very much %	Occasionally %	Not at all %	Total %
Laggard and late majority	55.1	20.4	24.5	100.0
Early majority and early adopter-innovator	64.7	31.4	3.9	100.0
All respondents	60.0	26.0	14.0	100.0

TABLE 12

Total Number of Information Sources Used Per Innovation and Respondent

Innovation	Total Number of Sources Used	Number of Sources Used per Respondent
Group 1		
Testing for mastitis	191	1.91
Use of paper towels or separate cloth	194	1.94
Sterilizing teat cup cluster	124	1.24
Use of insecticide-impregnated cords	167	1.67
Use of systemic warble fly control	62	.62
Average	148	1.48
Group 2		
Use of heat lamps for calves	285	2.85
Use of heated water bowls or tanks	198	1.98
Use of a bulk bin	327	3.27
Use of a hay conditioner	335	3.35
Use of a hay dryer	295	2.95
Average	288	2.88

TABLE 13

Percentage Distribution of Reasons for Rejection and Discontinuance of the Innovations by Time Spent in the Adoption Process

Innovation	Characteristics of the Innovation		Situational Factors		Total
	Less than one year %	One or more years %	Less than one year %	One or more years %	%
Regular testing for mastitis	68.2	31.8	0.0	0.0	100.0
Paper towels or separate cloths	75.0	25.0	0.0	0.0	100.0
Sterilizing the teat cup cluster	73.3	24.5	2.2	0.0	100.0
Insecticide-impregnated cords	48.2	40.7	11.1	0.0	100.0
Systemic warble fly control	85.7	14.3	0.0	0.0	100.0
Heat lamps for calves	66.0	32.0	2.0	0.0	100.0
Heated water bowls or tanks	21.0	7.4	64.2	7.4	100.0
Bulk bins	16.7	11.1	41.7	30.5	100.0
Hay conditioner	30.0	70.0	0.0	0.0	100.0
Hay dryer	14.5	27.4	27.4	30.7	100.0

TABLE 14

Percentage Distribution of Reasons for Rejection and Discontinuance for the Ten Innovations by Adopter Category

Reason	Adopter Category			
	Laggard %	Late Majority %	Early Majority %	Early Adopter-Innovator %
Relative advantage	60.9	62.3	64.2	78.4
Compatibility	1.1	3.9	2.5	0.0
Complexity	0.0	2.3	1.9	0.0
Divisibility	0.0	0.0	0.0	0.0
Communicability	0.0	0.0	0.0	0.0
Situation not appropriate	13.0	14.6	14.8	12.2
Scale of operation too small	23.9	14.6	16.0	9.4
Insufficient capital	0.0	0.0	0.0	0.0
Other situational factors	1.1	2.3	0.6	0.0
Total	100.0	100.0	100.0	100.0

TABLE 15

Percentage Frequency Distribution of Reasons for Rejection and Discontinuance by Innovation

Innovation	Rejection due to:		Discontinuance due to:		
	Characteristics of the Innovation %	Situational Factors %	Characteristics of the Innovation %	Situational Factors %	Total %
Regular testing for mastitis	75.0	0.0	25.0	0.0	100.0
Paper towels or separate cloths	100.0	0.0	0.0	0.0	100.0
Sterilizing the teat cup cluster	88.9	2.2	8.9	0.0	100.0
Insecticide-impregnated cords	88.9	11.1	0.0	0.0	100.0
Systemic warble fly control	100.0	0.0	0.0	0.0	100.0
Heat lamps for calves	96.0	2.0	2.0	0.0	100.0
Heated water bowls or tanks	28.3	67.2	0.0	4.5	100.0
Bulk bins	25.0	72.2	2.8	0.0	100.0
Hay conditioner	30.0	70.0	0.0	0.0	100.0
Hay dryer	41.9	58.1	0.0	0.0	100.0

TABLE 16

Percentage of the Respondents Which had Spent One or More Years in the Adoption Process, by Innovation Response State and Individual Innovation

Innovation	Innovation Response State			
	Continuing the adoption process %	Rejected the innovation %	Adopted the innovation %	Discontinued use of the innovation %
Regular testing for mastitis	2.0	12.0	10.0	2.0
Paper towels or separate cloths	3.0	20.0	2.0	0.0
Sterilizing the teat cup cluster	0.0	11.0	1.0	0.0
Insecticide-impregnated cords	23.0	11.0	2.0	0.0
Systemic warble fly control	19.0	1.0	0.0	0.0
Heat lamps for calves	4.0	15.0	29.0	1.0
Heated water bowls or tanks	12.0	10.0	4.0	0.0
Bulk bins	18.0	14.0	36.0	1.0
Hay conditioner	28.0	26.0	27.0	0.0
Hay dryer	36.0	36.0	2.0	0.0
Average	14.5	15.6	11.3	0.4

TABLE 17

Percentage of Respondents Which had Spent Less than One Year in the Adoption Process, by Innovation Response State and Individual Innovation

Innovation	Innovation Response State			
	Continuing the adoption process %	Rejected the innovation %	Adopted the innovation %	Discontinued use of the innovation %
Regular testing for mastitis	0.0	21.0	19.0	9.0
Paper towels or separate cloths	0.0	60.0	2.0	0.0
Sterilizing the teat cup cluster	0.0	30.0	6.0	4.0
Insecticide-impregnated cords	10.0	16.0	7.0	0.0
Systemic warble fly control	1.0	6.0	0.0	0.0
Heat lamps for calves	0.0	34.0	7.0	0.0
Heated water bowls or tanks	1.0	54.0	0.0	3.0
Bulk bins	0.0	21.0	9.0	0.0
Hay conditioner	0.0	14.0	3.0	0.0
Hay dryer	0.0	25.0	0.0	0.0
Average	1.2	28.2	5.3	1.6

TABLE 18

Percentage of Each Adopter Category Which had Discontinued Use of the Innovations

Innovation	Adopter Category			
	Laggard %	Late Majority %	Early Majority %	Early Adopter-Innovator %
Regular testing for mastitis	5.0	3.4	14.3	25.0
Paper towels or separate cloths	0.0	0.0	0.0	0.0
Sterilizing the teat cup cluster	0.0	0.0	0.0	25.0
Insecticide-impregnated cords	0.0	0.0	0.0	0.0
Systemic warble fly control	0.0	0.0	0.0	0.0
Heat lamps for calves	0.0	0.0	0.0	6.3
Heated water bowls or tanks	0.0	3.4	0.0	12.5
Bulk bins	0.0	0.0	0.0	6.3
Hay conditioner	0.0	0.0	0.0	0.0
Hay dryer	0.0	0.0	0.0	0.0
Average	0.5	0.7	1.4	7.5

TABLE 19

Percentage of Each Adopter Category Which had Adopted the Innovations

Innovation	Adopter Category			
	Laggard %	Late Majority %	Early Majority %	Early Adopter-Innovator %
Regular testing for mastitis	10.0	24.1	37.1	43.8
Paper towels or or separate cloths	0.0	6.9	5.7	0.0
Sterilizing the teat cup cluster	5.0	0.0	8.6	18.8
Insecticide-impregnated cords	0.0	6.9	14.3	12.5
Systemic warble fly control	0.0	0.0	0.0	0.0
Heat lamps for calves	0.0	20.7	51.4	75.0
Heated water bowls or tanks	5.0	0.0	2.9	12.5
Bulk bins	20.0	44.8	54.3	56.3
Hay conditioner	0.0	34.5	34.3	50.0
Hay dryer	0.0	0.0	0.0	12.5
Average	4.0	13.8	20.9	28.1

TABLE 20

Percentage of Each Adopter Category Which had Rejected the Innovations

Innovation	Adopter Category			
	Laggard %	Late Majority %	Early Majority %	Early Adopter-Innovator %
Regular testing for mastitis	10.0	48.3	37.1	25.0
Paper towels or separate cloths	70.0	69.0	88.6	93.8
Sterilizing the teat cup cluster	30.0	41.4	42.9	50.0
Insecticide-impregnated cords	15.0	20.7	34.3	37.5
Systemic warble fly control	5.0	6.9	2.9	18.8
Heat lamps for calves	65.0	69.0	37.1	18.8
Heated water bowls or tanks	55.0	62.1	77.1	50.0
Bulk bins	60.0	31.0	28.6	25.0
Hay conditioner	65.0	34.5	37.1	25.0
Hay dryer	80.0	58.6	62.9	43.8
Average	45.5	44.2	44.9	38.8

TABLE 21

Percentage of Each Adopter Category Which was Continuing with the Adoption Process for the Individual Innovations

Innovation	Adopter Category			
	Laggard %	Late Majority %	Early Majority %	Early Adopter-Innovator %
Regular testing for mastitis	0.0	6.9	0.0	0.0
Paper towels or separate cloths	0.0	10.3	0.0	0.0
Sterilizing the teat cup cluster	0.0	0.0	0.0	0.0
Insecticide-impregnated cords	35.0	31.0	34.3	31.3
Systemic warble fly control	10.0	17.2	14.3	50.0
Heat lamps for calves	0.0	0.0	11.4	0.0
Heated water bowls or tanks	5.0	10.3	17.1	18.8
Bulk bins	20.0	20.7	17.1	12.5
Hay conditioner	30.0	27.6	28.6	25.0
Hay dryer	20.0	41.4	37.1	43.8
Average	12.0	16.5	16.0	18.1

TABLE 22

Percentage of the Respondents Which was Continuing with the Adoption Process, by Innovation and Stage in the Adoption Process

Innovation	Stage					
	Awareness %	Interest %	Evaluation %	Trial %	Adoption %	Total %
Regular testing for mastitis	0	0	2	0	—	2
Paper towels or separate cloth	2	0	1	0	—	3
Sterilizing the teat cup cluster	0	0	0	0	—	0
Insecticide-impregnated cords	14	4	9	6	—	33
Systemic warble fly control	10	4	5	1	—	20
Heat lamps for calves	2	0	2	0	—	4
Heated water bowls or tanks	3	1	9	0	—	13
Bulk bins	0	2	15	1	—	18
Hay conditioner	0	4	21	3	—	28
Hay dryer	7	11	18	0	—	36
Average	3.8	2.6	8.2	1.1	—	15.7

TABLE 23

Percentage of Each Adopter Category Which was Unaware of the Individual Innovations

Innovation	Adopter Category			
	Laggard %	Late Majority %	Early Majority %	Early Adopter-Innovator %
Regular testing for mastitis	75.0	17.2	11.4	6.3
Paper towels or separate cloths	30.0	13.8	5.7	6.3
Sterilizing the teat cup cluster	65.0	58.6	48.6	6.3
Insecticide-impregnated cords	50.0	41.4	17.1	18.8
Systemic warble fly control	85.0	75.9	82.9	31.3
Heat lamps for calves	35.0	10.3	0.0	0.0
Heated water bowls or tanks	35.0	24.1	2.9	6.3
Bulk bins	0.0	3.4	0.0	0.0
Hay conditioner	5.0	3.4	0.0	0.0
Hay dryer	0.0	0.0	0.0	0.0
Average	38.0	24.8	16.9	7.5

TABLE 24

Percentage of the Respondents Which had Rejected the Innovations, by Innovation and Stage in the Adoption Process

Innovation	Stage					
	Awareness %	Interest %	Evaluation %	Trial %	Adoption %	Total %
Regular testing for mastitis	11	1	19	2	—	33
Paper towels or separate cloths	41	0	21	18	—	80
Sterilizing the teat cup cluster	18	0	10	13	—	41
Insecticide-impregnated cords	9	0	8	10	—	27
Systemic warble fly control	4	0	3	0	—	7
Heat lamps for calves	29	1	15	4	—	49
Heated water bowls or tanks	52	1	11	0	—	64
Bulk bins	10	0	25	0	—	35
Hay conditioner	13	1	23	3	—	40
Hay dryer	26	0	36	0	—	62
Average	21.3	0.4	17.1	5.0	—	43.8

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